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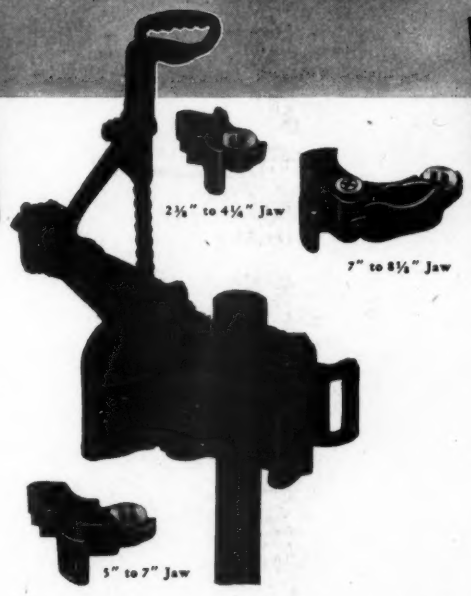
BJ

RIPLEX HOOKS

The world's safest and most convenient drilling hooks, made with either "Triplex" or "Duplex" body, in 300-ton, 200-ton, 125-ton and 60-ton sizes. Compact in design, and suitable for every drilling purpose.



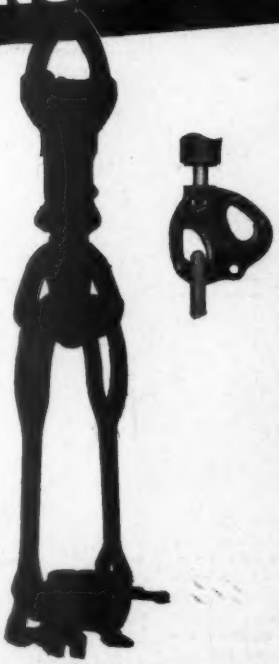
This new, light weight Type C tong is first choice for use on portable rigs, for work-over jobs, and for drilling with small diameter drill pipe. By merely changing one jaw, each tong fits all pipe from 2⅜" to 8⅝".

BJ

ROTARY AND CASING TONGS

BJ

TUBING HOOKS

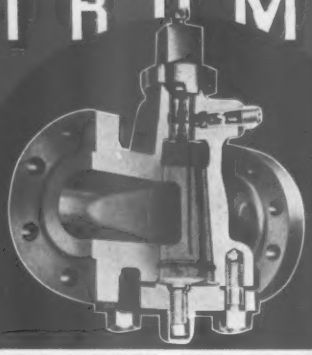


BJ "Duplex" Tubing Hooks with short overall length are extremely popular for handling tubing, and for work-over and perforation cleaning jobs where 50-ton and 75-ton loads are present. Available also with "single" body in the above two sizes, and in a short 30-ton type.

BYRON JACKSON CO.
HOUSTON • LOS ANGELES • NEW YORK

APRIL 22, 1943

NORDSTROM VALVES



. . . Make control a certainty

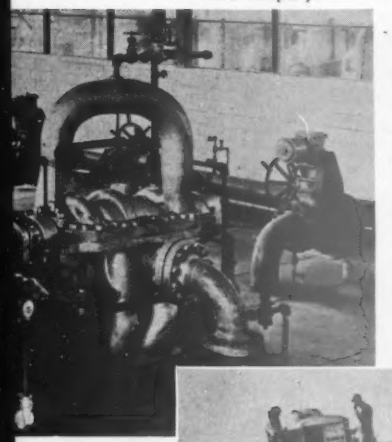
Eliminate frequent replacements

Series of Nordstrom Motor Operated Valves on manifold on property of a leading southern pipe line company.

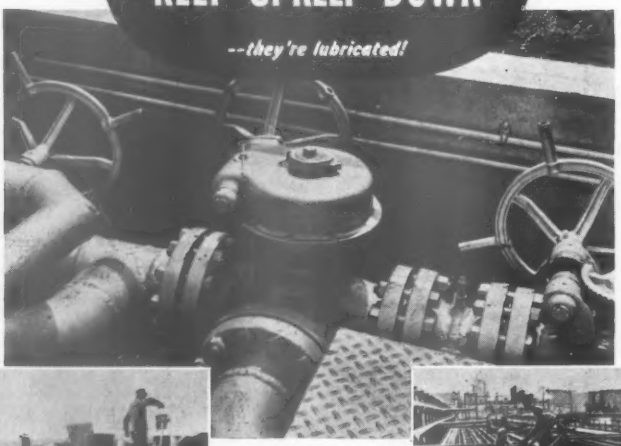
General view of 2-way pipe line booster station controlling flow of gasoline automatically with use of Nordstrom Valves.

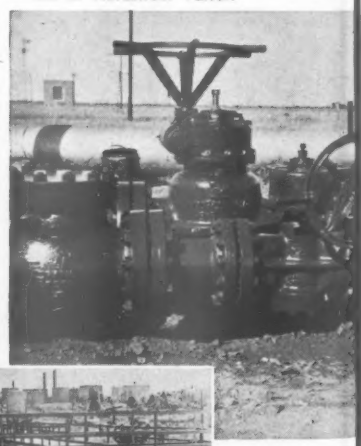
NORDSTROM VALVES KEEP UPKEEP DOWN

--they're lubricated!



In this pipe line station the Nordstrom Valves are operated by electric motors, or can be manually operated.





(At right) Installing Nordstrom Gear Operated Valves on gas transmission lines for city service.

Nordstrom 4" 3-way Hypreseal Multiport Valves delivering gasoline in a Michigan bulk terminal at 900-lb. pressure.

Close-up of scrap
er trap piping o
a Mid-Continen
pipe line, co
trolled with
Nordstrom Valve

(At left) Batter
of pipe lines lea
ing to a large r
finery. The man
operating a Nor
strom.

the OIL AND GAS JOURNAL

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General Heading: **BAKER MODEL "K" CEMENT RETAINER**

BAKER OIL TOOLS, INC.
Main Office and Factory:
6000 So. Boyle Ave., Box 127, Vernon Station, Los Angeles, Calif.
Central Division Office and Factory:
6023 Navigation Blvd., Box 3048, Houston, Texas
Export Sales Office:
19 Rector Street, New York, N. Y.

Unit No. **A-26**

Subject: **Cementing-Off Gas Sand**

Index: 250.1
Date: April 22, 1943
Page: 1 of 1 pg.

For many years the Baker Model "K" Cement Retainer has been "standard equipment" for solving many of the ordinary, as well as complex, problems confronting operators in cementing, well repair and well completion operations.

Today, with the necessity of conserving vital materials and precious time, it is more essential than ever before that every precaution be taken to insure the success of such repair and completion work as is necessary.

The Baker Cement Retainer has behind it a record of thousands of successful jobs, plus a service organization that has specialized in cementing problems. If you are not familiar with this device, it is suggested that you secure complete details from the nearest Baker office or field representative.

PROBLEM:

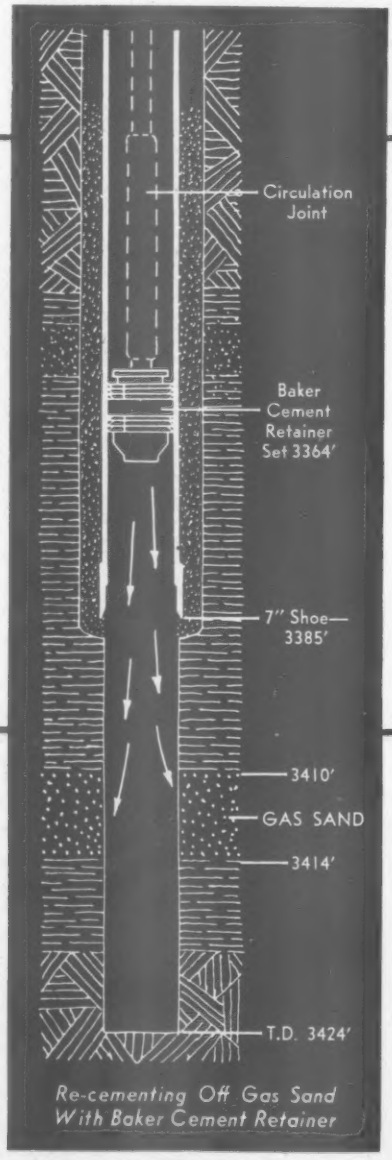
To Cement-Off a Gas Sand After Previous Attempts and Methods Proved Unsuccessful.

METHOD:

Set Cement Retainer and Squeeze Cement Below Casing Shoe with Multiple Batch Method.

RESULT:

Gas Sand Successfully Cemented-Off.



Re-cementing Off Gas Sand With Baker Cement Retainer

• DETAILS •

Field: Jal, N. M.
Depth of Well: 3424'
Depth Retainer Set: 3364'
Breakdown Pressure: 2000#
Final Pressure: 2600#
Number of Sax Mixed: 150
Number of Sax Put Away: 150
How Cement Discharged: Through Open Hole into Shoe below

★

Complete details concerning the Baker Model "K" Cement Retainer and its many practical field applications will also be found on pages 250 and 263 of the 1942 Baker, or Composite, Catalog.

★

Service Note

Competent Baker men will advise, make suggestions, and otherwise assist in securing best possible results.

BAKER CEMENT RETAINER

the OIL AND GAS JOURNAL

Trends

Crude-Oil Production
By States — Page 88

CRUDE PRODUCTION 3,966,270 bbl. daily average—up 32,460 bbl. One year ago 3,560,205 bbl.

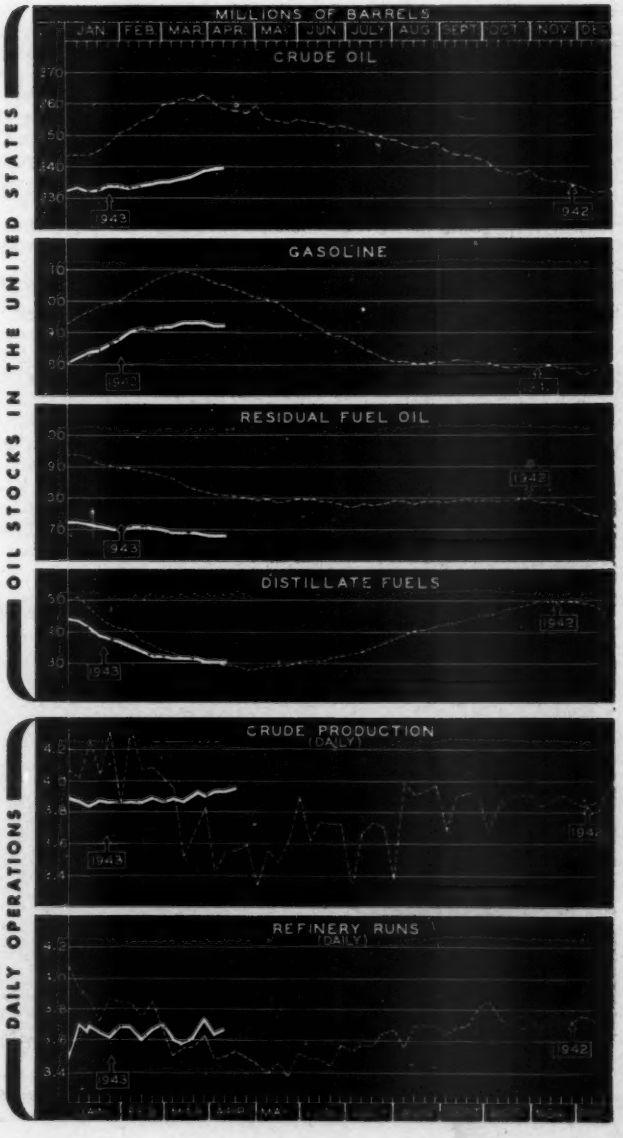
CRUDE STOCKS 239,925,000 bbl. as of April 10—up 61,000 bbl. One year ago 258,442,000 bbl.

GASOLINE STOCKS 93,212,000 bbl. as of April 10—down 197,000 bbl. One year ago 105,566,000 bbl.

RESIDUAL FUEL-OIL STOCKS 67,185,000 bbl. as of April 10—down 298,000. One year ago 81,947,000 bbl.

GAS OIL AND DISTILLATES 30,906,000 bbl. as of April 10—up 174,000. One year ago 29,567,000 bbl.

REFINERY RUNS 3,677,000 bbl. daily week ended April 10—up 53,000. One year ago 3,502,000 bbl.



IN connection with the current discussions relative to the decline in drilling operations so far this year and its relationship to supplies of crude oil in 1943 and later, economists of the petroleum industry are pointing out that the reductions in operations have been greatest in those areas with the largest reserves. Drilling up to April 17 had declined 23.5 per cent, compared to the same period in 1942. The only increases in the large general areas were the Rocky Mountain states, 20 per cent, and California 25 per cent. New discoveries account for the increased activity in the Rocky Mountain area, while the encouragement given West Coast operators by the Government, particularly in regard to the production of low-gravity crudes, is responsible for expanded operations in California. Crude-oil production in these two areas is greater than it was a year ago.

THE decrease in drilling in the Pennsylvania Grade and the eastern natural-gas areas of West Virginia, Pennsylvania and New York, where exceptions to the general spacing program have been granted, was only 16 per cent with a decrease of 8 per cent in the remaining oil area east of the Mississippi River. The small decline in the middle western states is largely accounted for by increased drilling in several fields of Illinois plus a small increase in Kentucky.

IN the northern Mid-Continent area of Oklahoma, Kansas, Missouri, Nebraska and Arkansas, the decline has been 13 per cent, a figure which includes a large percentage gain in Arkansas activity. It is in this upper Mid-Continent, Middle West and eastern area that the demands for crude oils exceed the supplies which are decreasing. The drilling situation changes abruptly in Texas, Louisiana, New Mexico and Mississippi, where 48 per cent of the nation's oil is being produced at this time, and where approximately 65 per cent of the proven reserves are located. In that area drilling has decreased 44 per cent, accounting for 77 per cent of the total decrease in this country. In those sections where it is agreed that the country will have to look for a large part of the enlarged production that will be needed later this year, the decline is greater than the average for the entire area. These decreases, so far this year, are: West Texas, 55 per cent; Texas Gulf Coast, 59 per cent, and Southwest Texas, 43 per cent. In North Central Texas, where conditions are comparable to those in the northern Mid-Continent, the decline up to April 17 was only 15 per cent.

Industry Awaiting Action On Crude Advance Recommended By Ickes

by Henry D. Ralph

WASHINGTON, D. C.—An immediate increase in the ceilings on crude-oil prices averaging about 35 cents per barrel has been recommended to the Office of Price Administration by Harold L. Ickes as petroleum administrator for war, the House committee on small business learned last week as the climax of a series of hearings on current problems of small oil producers.

It was also evident that the OPA is reluctant to act on this recommendation at this time, but a decision can be expected in "less than 2 months."

The PAW recommendation does not call for a flat over-all increase but for a range of increases which would average about 35 cents per barrel nationally. In some fields the increase might be as much as 50 cents per barrel.

The committee had an amusingly difficult time ascertaining the existence of the PAW recommendation. Despite authentic but unofficial reports that the recommendation had gone to OPA, Administrator Ickes on Thursday had told a press conference that he would neither confirm nor deny these reports.

On Friday the committee called as its first witness Administrator Prentiss M. Brown of OPA and asked him if he had received such a recommendation. He asked to be excused from answering in view of Mr. Ickes' position. The committee then called Sumner T. Pike, director of the fuel-price division of OPA, and asked him if he had written a memorandum to Mr. Brown on the PAW recommendation. This put Mr. Pike on the spot and he also asked to be excused from answering.

Mr. Ickes was then called and for a while he was equally evasive. Finally he admitted the existence of the recommendation by saying that Mr. Brown should give it out since "it is his letter, not mine." He then said that he did not approve of "nice political amenities sometimes called passing the buck," and that he thought the recommendation should be put in the record.

Pike Confirms Memorandum

Mr. Pike then returned to the stand and promised to supply the committee with a copy of the PAW recommendation and his own memorandum on it to Mr. Brown.

The recommendation was received by Mr. Pike late in the afternoon with a request for comments for Mr. Brown who was leaving town that evening, he told the committee, so he dictated a brief memorandum without giving the recommendation thorough study. He said he felt that this was a "bad time" to talk about increasing oil prices because of the current controversies over coal-mine wages and farm prices, and that he hoped this matter could be delayed until it could be decided on its own merits. His memorandum also said that he recognized that production in some fields is declining and that the present price might be a hardship in some cases, particularly in stripper-well fields, and that these might well need special prices but that offhand he did not think it necessary to raise the price to the whole industry in order to meet these special cases.

The president's "hold the line" executive order of April 6 does not necessarily prevent OPA from increasing the price of oil if it can be shown that a higher price is necessary to insure production of material needed for prosecution of the war. This was admitted by Administrator Brown, who told the small-business committee that if such a condition were established as a fact it would be the duty of OPA, under its statute, to raise the price of oil, but that the president's order requires OPA to exercise its discretion to raise prices to a minimum.

An increase in the price of crude is not an open-and-shut matter, and all

Col. E. O. Thompson, of Texas Railroad Commission, testifying before House committee on small business regarding oil-industry production problems. Committee members are: Representatives H. M. Jackson, Washington; Estes Kefauver, Tennessee; Wright Patman, Texas (chairman); Charles A. Halleck, Indiana

sorts of argument, testimony and evidence must be examined before a decision can be reached, Mr. Pike testified. He said the OPA has some evidence that the oil industry "is going along pretty well," but there is also some evidence that some price adjustments may be needed in certain quarters. Some areas, he said, are now producing all the oil they can or should, but others can produce much more, particularly in West Texas, where there is both sour crude and recently discovered sweet crude in lower horizons.

Observing that PAW took 2 months to study the price-increase request of the Petroleum Industry War Council, Mr. Pike said he hoped the OPA would be ready to act in less time than that.

Rep. Wright Patman of Texas, chairman of the committee on small

(Continued on Page 32)

Full Text of Administrator's Price Memorandum

An equivalent and concurrent adjustment in petroleum-product prices with a very substantial part of the necessary increase placed upon fuel oils to support the recommended advance of 35 cents per barrel on crude was proposed by Petroleum Administrator Ickes in his memorandum of April 7 to Price Administrator Prentiss Brown. Full text of Administrator Ickes' letter to Mr. Brown on petroleum prices follows:

BY Section 3 of Executive Order 9276 the president placed upon the petroleum administrator the duty of recommending to the price administrator such adjustments "in the schedule of prices charged for petroleum as will, in the judgment of the petroleum administrator, assure the efficient wartime operation of the petroleum industry and the maintenance of adequate supplies of petroleum for war, and essential industrial and civilian uses." After months of study, I have reached the conclusion that I must now recommend that a general upward adjustment of crude-oil price ceilings averaging approximately 35 cents per barrel, with necessary equivalent and concurrent adjustments in petroleum-product prices, is required to attain those objectives relating to the supply of petroleum and the efficient wartime operation of the petroleum industry, concerning which the president has asked that I express my judgment.

Exploration for and production of crude oil involve enormous risks. Evaluations of these risks cannot be reduced to exact mathematical formulas. They are peculiarly a subject for informed judgment. But the absence of an exact mathematical relationship between crude-oil supply and crude-oil prices must not be allowed to hide the fact that the rate of new discoveries and the ultimate available production from presently known reserves are in no small degree a function of price. Our studies convince us that in a matter of months, unless new fields are found more rapidly, secondary recovery stimulated and somewhat higher cost production prolonged, we face first a loss of recoverable reserves arising from a wasteful forcing of such flush fields as we still possess, and shortly thereafter an actual scarcity of sufficient amounts of even reasonably low-cost crude oils.

I recognize fully the dangers of price inflation. But price inflation connotes an unwarranted rise in prices without promise of increasing supply. My fear is that unless we are prepared now to permit some increases in oil prices in order to stimulate increases in our available supplies, our reserves will continue to be depleted at such a pace that only a drastic increase in prices—perhaps several dollars a barrel, as contrasted with a tenth of that amount if we act now—will be required to find and produce the oil we are certain to need both during the war and after. An inflationary price spiral, once started, is difficult to arrest. A deflationary effect upon our ultimately recoverable reserves, and our daily capacity to produce, can likewise spiral and be difficult to arrest. Once we are compelled to produce our oil fields in excess of their efficient rates, we lose both ultimately recoverable production and daily capacity to produce.

I do not know what you will consider to be the effect upon other prices of a rise in crude-oil prices which, when translated into products, will amount to less than 1 cent per gallon. That is a matter which has been entrusted to your judgment rather than mine. So far as the consumers of petroleum products are concerned, I am sure that they prefer moderate prices and adequate supplies for the long pull rather than to be compelled to pay for artificially low prices now with ridiculously high prices and scarcity a very little later. Measured in terms of our oil supply—the task entrusted to me—I am not prepared to assume the responsibility of risking a repetition of what occurred at the close of the last war, when after crude-oil prices had been rigidly frozen and our reserves depleted, crude-oil prices rose to $3.50 and even $4.30 per barrel and untaxed gasoline to 25 or 30 cents

Sumner T. Pike, petroleum adviser to OPA, who voiced general disapproval to higher petroleum prices, is shown conferring with Price Administrator Prentiss Brown at one of the congressional oil committee hearings last week

per gallon. Moreover, had that war lasted but a little longer, the oil shortage might then have made it difficult to supply the armed forces with enough oil. The possibility of such difficulty in this war, if it be long protracted, is a risk that should be carefully considered.

I shall not burden you in this letter with the details of the careful surveys which I have had made showing the extent and the decline in our known crude-oil reserves during the past few years. Suffice it to say that we believe our reserves to be larger, when measured in barrels, than the petroleum industry has frequently estimated, but much smaller, when measured in years' supply, than the American people have recognized. The industry has followed the practice of making estimates on what it termed a conservative basis. The flaw in this type of estimating lies in its tendency, since 1938, to screen a decline in newly discovered oil. For by the simple expedient of enough yearly "corrections" for past "conservatism" some industry statisticians have made it appear that reserves have kept pace with consumption. But "corrected" figures do not represent new discoveries. This office has found that if the subsequently "corrected" reserves of each field discovered since 1928 are actually allotted to the year in which that field was found, we have not found enough new oil during the last 4 years to replace withdrawals necessitated by constantly accelerating demand. As one independent oil expert has aptly described it, we need to find more oil with the drill and less with a pencil.

Reserves Relatively Unimportant

Actually, it is relatively unimportant whether present known reserves total 20,000,000,000 bbl. as the industry recently has estimated, or somewhat more as our surveys show. Neither amount can be produced in toto in less than half a century. Neither amount is capable of sustaining withdrawals at the rate of 1,400,000,000 bbl. annually much beyond the present year. What is worse, if it becomes necessary to produce existing fields in excess of efficient engineering rates, ultimately recoverable reserves will have to be "corrected" downward as they have been "corrected" upward.

You may ask how much of a price increase is required to rectify these conditions. I do not know exactly and I am quite certain no one else knows. If anyone knew with mathematical exactitude, finding and producing oil would not involve such enormous risks. But this I do know—an increase in price makes it economically possible to increase recoverable reserves (1) by postponing the date of abandonment of thousands of pumping wells, (2) by the installation of more and better secondary-recovery equipment, (3) by drilling edge properties and so-called marginal locations, and (4) by attracting venture capital from both within and without the petroleum industry to undertake that greatest risk of all, exploring for new fields. Of course, material, labor, and other costs have risen in the producing branch of the oil industry. With the introduction of overtime, necessitated by the 48-hour week, labor costs will rise still further. Such factors as these can be more or less exactly measured. But none of these items of added cost, however much they can and do justify some increase in crude-oil prices, is as important as the hard, cold facts of declining rates of discovery and increasing demands.

My present recommendation of an increase in the price ceilings for crude oil may be too little, but strictly from an oil standpoint, I am confident that it is not too much. Fortunately, the Government can test it pragmatically, just as the industry always has in times past. If in the months to come the action now recommended reverses the decline in reserves or the rate of new discoveries, we shall know that it is effective. If not, the subject should be reexamined. To the extent that some may derive a small windfall from such an increase, I prefer to leave that to be largely recaptured by existing taxation rather than have the Government itself enter this most speculative of businesses, or by indirection, reach the same result by undertaking the colossal task of administering some subsidy arrangement. The true costs of finding and producing oil, including the risk of loss as well as the chance for profit, ought to be borne by the users of the product in proportion to their use and not become a governmental charge against user and nonuser alike.

In the specific application of general upward adjustments in crude-oil price ceilings, I recommend that due allowance be made for radical changes in the sources and methods of transporting crude oil which have occurred since prices were frozen almost 2 years ago. For example, Gulf Coast crudes formerly hauled to East Coast markets by tanker enjoyed a transportation advantage as against many interior crudes. Now, with crude and products moving overland rather than by sea, this condition is reversed. Accordingly, in order the better to solve the problems of local shortages arising from the disruption of normal methods of transportation, it would seem desirable for some crudes in some areas to be advanced more than 35 cents per barrel, and in other cases less. Here actual differentials based on reasonable exact formulas can be worked out between our respective offices with the aid and assistance of industry.

As to what I have called necessary equivalent and concurrent adjustments in product prices, unless these be made, the small nonintegrated, independent refiners will be squeezed between the two millstones of rising raw-material costs and fixed refined-products prices. This not only tends toward monopoly but also may result in a loss of refining capacity which cannot be spared. All that I urge at this time is that in translating higher crude prices into higher product prices, a very substantial part of the necessary increases should be placed upon fuel oils. Only thus can we preserve and protect our essential reserves of crude oil by deterring their dissipation in admittedly inferior uses. Our known supplies of coal are measured by thousands of years—our known supplies of crude oil by little more than a decade. Coal readily can be used where oil too frequently is burned. Quite recently coal prices have been advanced. Comparative price levels as between these two commodities must not be frozen in such a manner as to make it profitable to burn the scarce rather than the plentiful fuel.

Decision Up to OPA

I am sure you realize the magnitude and the complexity of revising price ceilings to effectuate these general recommendations in a specific and practicable way. It is hardly a task that either of our hard-pressed staffs should be asked to undertake unless it is known in advance that your office, in which the power to make the adjustments resides, agrees that some general crude-oil advance is justified by the basic facts here submitted. It may be that you will desire to consult with the director of the Office of Economic Stabilization on this point. My views, of course, represent my judgment on the oil situation only. Having weighed these views, you or the director of economic stabilization may deem the risk of an oil shortage less grave than the risk of other possible effects upon the nation's economic structure. If so, under your statutory powers, that is clearly a decision that you, not I, should make.

I am sure that I need not add that all of the documentary detail on this whole subject, both that submitted to this office by the industry and our own independent surveys, is available to you and your office.

This recommendation is sent to you under personal cover and by messenger further to assure against any publicity or disclosure prior to such time as you yourself may desire to make known its content. I have been at pains to see that those on our staff here who have worked on the problem respect the confidential nature of the assignment, and I have every confidence that they will do so.

I shall appreciate an early expression of your views.

Oil trains loaded at a Persian Gulf port ready to move north to the Caspian Sea, delivering aviation fuel and other vital peroleum products to the Soviet fighting forces, lend-lease in operation

Sovfoto

THIS WEEK

MARKETS—Administrator Ickes' recommendation for crude advance, averaging 35 cents per barrel, kicks price deadlock off center. . . . OVERLOOKED by many was section of PAW memo asking "adequate and concurrent" adjustment of product prices, mostly beamed at fuel oil. . . . ¶OPA shapes ground for delay on oil-price action, while all aspects are analyzed. . . . Sumner Pike, OPA petroleum adviser, on record opposing oil-price rise, admits conclusions hastily drawn, BUT rejects accusation that prejudgment prevails. . . .

DRILLING—Radical modification of well spacing, in California fields, in the works. . . . General rules drawn for practically every important California field. . . . Details of administration assigned to PAW's District 5 organization. . . . Decentralization move relieves Washington of most decisions. . . . General policy may soon spread to other districts. . . . Specific regulations to be announced from Los Angeles. . . .

REFINING—Prediction that crude runs to stills by end of this year will average 4 million barrels daily reaffirmed before N.P.A. . . . Seventy-five per cent of projected refinery throughput earmarked for war products. . . . ¶Replies to Texas questionnaire, seeking additional sour-crude outlets, contain little optimism for West Texas producers. . . . Certainty persists, however, that Middle West refiners will be forced, eventually, to draw more heavily on Permian basin supplies. . . .

RUBBER—Conflict between Rubber Director Jeffers, Information Director Davis bobs up again—this time over OWI report on situation. . . . OWI stresses dark side of picture, Jeffers, rightly or wrongly, leans to more optimistic view, emphasizes accomplishments, rather than deficiencies. . . .

PRODUCTION—Next month's quota on all petroleum products, certified by PAW, calls for daily output of 4,237,400 bbl., up 51,300 from April. . . . ¶Texas, rising to 1,562,000, assigned 60,000-bbl. increase. . . . Changes elsewhere minor and insignificant, EXCEPT to reflect normal declines in District 2. . . .

TRANSPORTATION—Crude tendered at WEP Longview terminal insufficient to fully engage facilities, both line capacity and Norris City shipping accouterments. . . . Reports current that plans for moving No. 2 heating oil through 24-in. line may be dropped, switch freed capacity to movement of South Texas and West Texas crudes. . . . ¶Construction pace accelerated on eastern extension of WEP crude line, pipe moving to right-of-way for 20-in. products line. . . . ¶Permian basin producers endorse Stanolind proposal for 16-in. crude line, from Slaughter pool to Drumright, Okla. . . . ¶ODT forecasts eastward petroleum movement will reach 1,611,000 bbl. daily, by final quarter. . . . Director Eastman admits calculations are modest. . . . They compare with PIWC forecast of 1,730,000 bbl. daily at end of year, including service through 20-in. . . . ¶Rail shipments to East Coast hit new peak of 924,079 bbl. daily, up 11,160. . . .

RATIONING—Cut in value of eastern mileage coupons considered. . . . Voluntary restraint on pleasure driving admitted failure, in comparison with enforced ban during winter. . . .

Industry Awaiting Action On Price Advance

(Continued from Page 29)

business, asked Mr. Pike if there is any alternative to a price increase as a means of increasing production. The OPA official replied that he is not familiar with statistics that show a declining discovery rate and does not admit that a price increase is needed to increase exploration, but that he is opposed to a government subsidy for drilling and would prefer an over-all price increase if this should be proved necessary.

Chairman Patman declared that OPA delays too many things and that it would be better for it to make a few mistakes than to put things off so long. He declared that a recommendation from PAW carries a presumption of authority and its opinion should govern, and added that his committee is becoming increasingly impatient at OPA's failure to act.

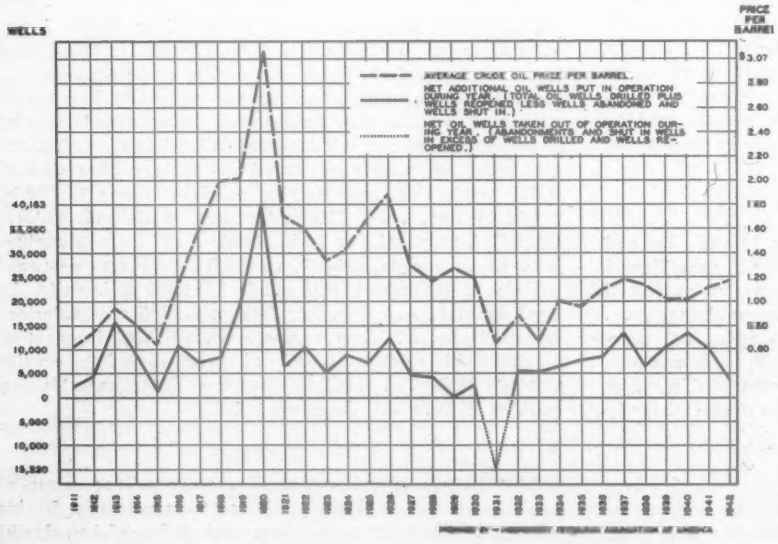
Administrator Ickes told the committee he feels PAW should have authority over oil prices and had requested this power but had been denied. Nearly 2 years ago, he said, he asked OPA to make a study of the crude-oil price situation but nothing had been done. Under the authority now vested in PAW, he said, it is his duty to recommend that OPA increase crude prices.

Making an obvious dig at OPA, Mr. Ickes said that when price ceilings were established on major commodities the price of crude oil was below parity with other products and the oil industry has suffered under this handicap. The oil industry has never been given a fair hearing by OPA, but was turned away when it asked for consideration, he insisted. As for the timing of the PAW recommendation, Mr. Ickes said it is always a bad time to ask OPA for an increase in oil prices, that he had been asking it for 2 years and that the industry asked for an increase of 25 cents per barrel 2 months ago and that was before the coal-wage negotiations opened.

When Mr. Ickes left the stand he was given prolonged applause from the several dozen oil men in the audience, and Chairman Patman had to rap for order repeatedly before the hearing could be resumed.

Fell Cites Figures Showing How Low Price Subdues Exploration

ON Thursday morning H. B. Fell, of Ardmore, Okla., executive vice president of the Independent Petroleum Association of America and speaking also for the National Stripper Well Association, filed with the committee the recent report of the committee on cost and price adjustment of the Petroleum Industry War Council and called particular attention to sections of the report dealing with declining production and reserves. He also submitted figures from the Bureau of Internal Revenue showing the number of oil producers who reported no net income and declared that reports for more recent years, when available, will show even more widespread losses among producers.



Relation of net additional oil wells put in operation to average price of crude

He introduced a chart showing the price of crude oil and the net addition of new wells for every year from 1911 to 1942 which showed graphically the close relationship between the two. He said this chart demonstrates that it takes from 1 to 2 years for an increase in price to be reflected in a considerable increase in the number of producing wells.

Tariff Report Criticized

A. K. Swann, Evansville, Ind., attorney for the Tri-State Petroleum Association, told the committee that the Tariff Commission report dealt only with the margin of profits from wells drilled under conditions not now existing. Were these same wells drilled under present cost conditions the price of crude would have to be 50 cents to $1 per barrel higher than it now is for producers to break even, he declared. Prices charged by drilling contractors are now 75 cents to $1 per foot higher, and the cost of moving into a new location is three times as high, as a year ago. The most important question, Mr. Swann said, is not the margin of profit of owners of producing wells but the immediate necessity for bringing in new oil fields.

T. A. Morgan, director of conservation of the Kansas State Corporation Commission, also told the committee that an increase of at least 50 cents per barrel in the price of crude oil is necessary at once if wildcatting is to continue in his state. He presented a statement giving statistics on present conditions in the producing industry in Kansas in which he said in part:

"I would like to present here the program of Kansas for the first quarter of 1943. We drilled in Kansas for this period 352 wells, of which 174 were oil wells, 7 gas wells, 171 dry holes. Of this amount 94 of these wells were wildcats (that is, wells 1 mile or more from a producing well). Of the 94 wildcat wells, 15 were producers and 79 were failures. Figuring the 15 producing wells at $30,000 per well or $450,000; 79 dry holes at $15,000 or $1,085,000, the expenditure would be $1,535,000. Assuming that each of these 15 wells will adequately drain the 40 acres on which it is drilled, we have developed 600 acres. Figuring a total recovery of 4,000 bbl. per acre, or 2,400,000 bbl., and dividing the $1,535,000 by 2,400,000 bbl. will give 63.9 cents or the discovery cost per barrel. This is not an unusual picture in the oil industry. Thus it is very readily shown that with a discovery cost of 63.9 cents per barrel, a lifting cost of 30 cents per barrel, and 35 cents per barrel for roy-

alties, delay rentals and bonuses, it amounts to $1.29 before taxes, salaries, exploratory costs as against crude oil selling at $1.17 per barrel at the well today.

"The producing division cannot continue to operate under such conditions. This is the reason wildcatting is slowing down, and many men in the industry are disposing of their oil properties and investing in other lines of business."

Operators Vent Complaints Before Patman Committee

WASHINGTON, D. C.—At the House petroleum subcommittee hearings which opened April 13 Chairman Clarence F. Lea of California announced that his group is making a survey of present conditions in the oil industry and that these public hearings were called to give independents a chance to talk about production problems and to help the committee in its studies.

The first witness was Russell B. Brown, general counsel of the Independent Petroleum Association of America. He declared that petroleum production has become a matter of national concern because it is now a question whether this country will be able to meet the war demands for oil products.

Industry Growing Weaker

Sharply criticizing the Petroleum Administration for War, Mr. Brown declared that during the past 2 years the oil industry has grown weaker in its ability to meet the demands of war. Its ability to produce oil has been reduced by 200,000 bbl. per day, he said; it has withdrawn nearly 60,000,000 bbl. from storage; it is at the lowest point in new discoveries; its access to materials is very limited; nothing has been done to protect its manpower, and it is denied a price sufficient to maintain its capacity. He added that PAW has not made clear to the War Production Board the need for materials to maintain the industry in position to produce the oil needed for the war and for more than a year did not attempt to secure a higher price for oil from the Office of Price Administration; also that the oil industry, once having one of the highest wage rates, now is losing its skilled labor to war plants and soon may lack the manpower to fulfill its war duties.

Harold F. Thompson, of Dallas, Tex., counsel for the American Association of Oil Well Drilling Contractors, told the committee that drilling costs have increased 20 to 40 per cent and that contractors cannot absorb such increases. He said that the cost of rig building is up 15 per cent, labor up 20 per cent, materials up 15 per cent, transportation up 15 to 20 per cent, and other expenses up 20 per cent. In addition, he said, materials are difficult to obtain and many of them are inferior. Drillers can probably maintain their present activities for a while, Mr. Thompson said, but they would not be able to expand their activities by as much as 5 per cent because of these increased costs and supply difficulties, and the loss of skilled drillers to other occupations.

J. C. Hunter, of Abilene, Tex., president of the Mid-Continent Oil and Gas Association, said that the nation does not have the capacity to produce, with or without waste, much more oil than it is now producing and is facing a grave danger of having to use production methods which will decrease ultimate recovery and also destroy much of our present capacity. Production of all wells at full capacity would soon decrease output to the point where secondary-recovery methods would be needed very generally, and the length of time required to put these into operation might cause the loss of the war for lack of oil, Mr. Hunter declared.

Objections Center Around Strangling Influence of PAW

IN opening the hearings April 14, Chairman Patman said his office had been almost swamped with letters from all factors in the oil business, particularly the production end. "Complaints have been numerous of the handicaps under which all independent operators are functioning, many of them unable to function due to conditions over which they have no control," he said. "According to these letters, they have been deterred from doing their utmost."

The first witness was Russell B. Brown, general counsel of the Independent Petroleum Association of America, who declared that the problem of oil production has become of national importance. He told the committee that the country's capacity to produce oil had fallen off by more than 200,000 bbl. per day since we entered the war, in addition to withdrawal of 58,000,000 bbl. from storage.

Col. Ernest O. Thompson, of the Railroad Commission of Texas, outlined the oil-production problem to the committee.

An increase of 58 cents per barrel in the price of crude would mean an increase of about 2 cents per gallon in the price of gasoline to the consumer, but Colonel Thompson said the increase should be passed on rather than absorbed by the industry and that the price to consumers is less important.

Among the independent producers who attended the hearings before the House committee on small business in Washington last week were: H. B. Fell, Ardmore, Okla.; H. M. McClure, Alma, Mich.; N. W. Shiarella, Owensboro, Ky.; O. L. Sutbois, Vincennes, Ind.; A. H. Ledbetter, Mount Pleasant, Mich.; and E. J. Doley, Hays, Kans.

Plenty of Tank Cars But Not Enough Oil for WEP

by Paul Reed

WHILE tank cars rolled in and out of the War Emergency Pipelines, Inc., Norris City, Ill., terminal at a record-breaking rate over last week end, the system was faced with a sudden shortage of crude at Longview, Tex., which threatens to prevent filling the April schedule.

When 1,275 tank cars in 17 trains were loaded out of Norris City in a 24-hour period at the beginning of this week, New York Central Railroad went far ahead of its original promises to handle cars at the rate of 900 daily. In fact, observers earlier doubted that a 1,200-car rate could be exceeded. Now it has been demonstrated that no congestion was to be expected for such a volume of traffic. Full capacity of facilities is still to be tested.

Movement of 1,275 cars carrying approximately 267,000 bbl. when added to the 55,000 bbl. daily which can go by the 14-in. pipe line from Norris City to the Ohio Pipe Line Co. at Enfield, Ill., gives a total of 322,000 bbl. daily.

With only 245,000 bbl. of storage stock at Norris City at the beginning of this week and with only a prospect of getting an additional 1,600,000 to 1,800,000 bbl. to the Longview terminal as the result of informal commitments from Sun of approximately 300,000 bbl. of Gulf Coast light crude, from Stanolind of 360,000 bbl. of East Texas crude and from Gulf of 700,000 to 900,000 bbl. of crude, the outlook is unfavorable for WEP meeting its April schedule of 5,775,000-bbl. delivery. Unless sufficient additional oil is furnished, the system will be short of requirements by about 80,000 bbl. per day according to reports. An effort is being made to discover whether there is a substantial amount of oil in storage which should be offered for transportation through the line.

Difficulties entailing temporary delays were encountered this month in efforts to move No. 2 heating oil through a reversed converted line. However, before these are overcome, it is reported that there is a possibility that the program for batching heating oil through the WEP line may be dropped and that plans may be devised for bringing Southwest Texas and West Texas crude through existing lines to Longview to fill the WEP line. It has been recognized from the start that crude supplies near Longview alone would be insufficient for operating the big-inch line continuously for a prolonged period.

CRUDE SHIPMENTS FROM WEP NORRIS CITY TERMINAL

Date—	Tank-car movement direct from Norris City: Cars	Tank-car movement direct from Norris City: Bbl.	Delivery to Ohio Pipe Line at Enfield, Ill. (bbl.)	Total (bbl.)
April 11	899	195,421	55,744	251,165
April 12	450	100,707	12,100	112,807
April 13	975	210,403	None	210,403
April 14	973	214,200	None	214,200
April 15	900	197,518	40,224	237,742
April 16	1,049	230,349	19,015	250,015
April 17	1,050	228,900	None	228,900
Total, 7 days	6,296	1,377,588	127,083	1,505,322
Daily average	899	196,798	18,154	215,047

Texas' Crude Quota Raised

FORT WORTH, Tex.—Demand for Texas production was upped another 60,000 bbl. daily by the May allocation of PAW announced at the hearing of the Texas Railroad Commission here April 16. Daily average production during May will be 1,562,000 bbl. and observers of the state's production trend are rather curious as to how long the state can produce at that rate. Approximately 120,000 bbl. of the total authorized production is distillate and natural gasoline.

Jarring note in the higher nomination was the specification that the increase come from the pools in the state which yield sweet and asphaltic-base crudes. This caused considerable concern among the operators who are principally interested in the West Texas Permian basin area.

The directive from Administrator Ickes specified an additional 60,000 bbl. of sweet oil for delivery to the War Emergency pipe line which now terminates at Norris City, Ill., and 36,000 bbl. additional asphaltic-base crude to bring the state's output of this type oil to 71,000 bbl. daily. According to a telegram from R. K. Davies, assistant petroleum administrator, the WEP will not be able to handle any heating oils during the coming month but there is a great need for the additional sweet oil at eastern refineries.

Asphaltic-crude requirements at Houston were listed as 12,400 bbl. daily; New Orleans, 14,000 bbl.; Beaumont-Port Arthur, 8,600 bbl.; and PAW District 1, 36,100 bbl. daily.

Humble Seeks Increase

Humble Oil & Refining Co. requested an increase in delivery to its plants and facilities of at least 13,000 bbl. daily in addition to 8,000 bbl. of the intermediate octane grades. Humble's receipts are 27,600 bbl. below its nominations and the company raised its nominations 22,545 bbl. Requirements of Humble were outlined as 5,000 bbl. of 91-octane crude at the Ingleside plant; 6,000 bbl. daily of Refugio light crude for Canadian shipment; 9,000 bbl. daily of lube-type crude for Canadian delivery; 12,800 bbl. daily of asphaltic crudes for eastern refineries; 4,150 bbl. of East Texas crude for the WEP and 2,350 bbl. of West Central Texas crude for shipment to the East Coast.

East Texas field bottom-hole pressure rose 4.3 lb. per sq. in. during March to 1,020.44 lb. per sq. in. on April 1. Injection of salt water in the pool has reached 90,852 bbl. per day and before long will be increased another 70,000 bbl. daily.

Much of the meeting was taken up with the discussion of the West Texas sour-oil problem and the commission released figures showing refineries were using 209,850 bbl. of this type crude daily and that there was capacity for an additional 47,500 bbl. daily. Texas refineries are now using more of the sour crude than they did in 1941 and 1942.

View of the Cumberland field looking west. Pure's company and district headquarters are 1 mile west of the bridge in the center background which crosses the Washita River

Dikes to Protect Cumberland Field

CHANGING the course of the Washita River in southern Oklahoma to protect the Cumberland oil field from flood waters of the $50,000,000 dam at Denison, Tex., has been disclosed by Denison District Army Engineers.

Three dikes, estimated to cost approximately $5,000,000 and requiring 9,000,000 cu. yd. of earth, will hold off water from the 64-section oil field which has a reserve equal to about one-third of the combined reserves of all new fields discovered in the United States during 1942.

Col. William W. Wanamaker, chief of the engineers at Denison, has won approval for the project at Washington and last week end (Apr. 16-17) presented the proposal to officials of the Pure Oil Co. at Chicago.

The Cumberland field lies along the banks of the Washita River in Bryan, Marshall and Johnston counties of Oklahoma. Normal floods on the Washita in the last 2 years have delayed drilling activities. The Pure Oil Co. owns the 30,000 acres in the producing area.

The engineers at Denison have refused to disclose details of the proposed dikes until final acceptance of contractors' bids.

Until the dikes were proposed, the field faced the fate of being inundated by 15 ft. of water, necessitating conversion to what would then have been a marine operation. Left dry, the field will continue to operate unmolested by waters of the dam and the floods that often inundate the Washita River bottoms.

Authorities, who cannot be quoted by name, have declared the Denison Dam would have never been constructed had the field been discovered a year earlier. Work began on the dam in 1939 and the field was discovered early in 1940.

The Denison Dam, scheduled for completion this fall, is to begin production of electric power by January 1, 1944. But unofficial sources declare production will be delayed unless adequate protection has been afforded the Cumberland field.

The Washita River will be diverted to the east of the field. A range of hills will afford natural barriers to keep the river from the field, once dikes have been constructed on the north to divert the stream, and on the south to withhold backwaters from the Washita and the lake to be impounded behind the dam.

Denison engineers have hinted that prisoners of war likely will be used in some of the dike-construction work. Plans already formulated provide for use of prisoners of war to clear timber lands in the reservoir section of the dam. A prison camp has been completed at Tishomingo, Okla., north of the field.

Time required to construct the dikes has not been disclosed, but engineers have announced that work will be rushed to provide protection to the field in an effort to have power production under way for war installations in the Denison area by January 1.

The Cumberland field, so called for a small community in the producing area, provides $50,000 annually in taxes to schools and political subdivisions in the three counties. As more wells are completed, the annual tax rate increases.

The first well drilled by Pure was completed at a depth of 5,100 ft. in the Bromide sand, producing 4,520 bbl. per day of 36-gravity oil. Further drilling has proven that the McLish sand, a lower member of the Ordovician section, is also productive. There is good reason to hope, Pure executives contend, that other sands at still lower depths will prove equally productive. This possibility is now being explored. Subsequent events have materially enhanced the high value originally placed on the field by the company.

Immediately following the discovery in the Bromide sand and the later discovery in the McLish, the Corporation Commission of Oklahoma established proper spacing plans for each of the two producing horizons, and an orderly and systematic development program was undertaken and has been carried on by the company, temporarily interfered with to some extent by a partial restriction in drilling imposed by the federal Government as a consequence of the shortage of materials resulting from the war program. After the war emergency has passed, locations now temporarily omitted will be drilled.

Eight strings of rotary tools, including one owned and operated by Pure, are continuously busy in the field.

Sixty-six wells have been completed, and these wells, producing through 2½-in. tubing and 1-in. choke, have a combined potential of more than 50,000 bbl. per day. Under proration, the field is currently allowed to produce 8,500 bbl. a day and could produce two or three times as much without violating sound conservation practices.

Warren Petroleum Corp., pursuant to purchase contract with the Pure, has installed in the field and is operating a processing plant capable of handling all casinghead-gas production.

Homes in the southwestern portion of the company's camp at Cumberland

State Capitals

LOUISIANA

CONSERVATION AUTHORITIES of Texas, Louisiana and Arkansas are seeking uniform production regulations for the Rodessa field, which straddles the three states. The problem is expected to be considered soon by the Louisiana Conservation Commission at Shreveport, with conservation authorities from Arkansas and Texas in attendance at the meeting.

WYOMING

A BILL has been introduced at Washington by Sen. Joseph C. O'Mahoney, of Wyoming, to authorize an expenditure of $500,000 for the construction and equipping of a petroleum experiment station at Laramie to be operated by the Bureau of Mines on the campus of the University of Wyoming. The bureau has an experimental plant at the university which is in charge of H. R. Larue, supervising engineer. The new plant would be in addition to the one now in operation and it is proposed to carry on extensive experiments in the production of oil from shale and coal as well as continuing the present work.

The station now in operation is carrying on extensive research on asphalts which has an important bearing on the construction of military highways and airport runways. These studies are said to show that the black oils of the Rocky Mountains are suitable for the manufacture of asphalts and that the production is similar to that obtained from the crude oils of California, Mexico and Arkansas.

OKLAHOMA

AN AGREEMENT extending Oklahoma's membership in the Interstate Oil Compact for 4 years from September 1, 1943, was signed at Oklahoma City last week by Gov. Robert S. Kerr. Execution of the agreement was authorized by Senate Bill 10 which was enacted by the 1941 legislature, giving the governor authority to execute further extensions.

RULES AND REGULATIONS governing the production from oil fields and from the Medrano sand in the West Cement gas field during May are to be considered by the Corporation Commission at the regular monthly hearing in Oklahoma City April 28. Purchasers and producers of crude oil and natural gas will hold their usual informal meeting at 10 a.m. in the commission's court room preceding the formal hearing which starts at 11 a.m.

CALIFORNIA

THE LOS ANGELES City Council annexed 260 acres in the Wilmington district to the city of Los Angeles in order to be able to provide an adequate water supply and electrical energy to the Defense Plant Corporation's butadiene plant now under construction. This is a major installation and will require construction of a 24-in. water main to supply 20 second-feet of water. It is estimated the plant will require about 25,000 kw.-hr. of electricity when in full operation.

COMPACT EXTENDED . . .

Governor Kerr signing the agreement extending Oklahoma's membership in the Interstate Oil Compact as Reford Bond, the state's representative on the Compact Commission and chairman of the Corporation Commission, looks over his shoulder

It is about 50 per cent completed and already looks like a major project. It will be leased to Shell Oil Co., Goodyear Tire & Rubber Co., Dow Chemical Co. Contributors of raw material will include the Southern California Gas Co.'s generating plant which has been revamped. In addition to the water and electricity the plant will require 25,000 bbl. per day of gasoline and/or other light fractions.

KANSAS

THE REGULAR state-wide proration hearing will be held at the Allis Hotel, Wichita, April 27, the Corporation Commission announced last week. Usual instructions were issued to operators and purchasers to be prepared to submit testimony on producing conditions in the state's various fields and on the market demand for May.

TEXAS

THE SENATE last week passed the House bill suspending the primary terms of oil and gas leases granted by the state's School Land Board where owners are prohibited from drilling by government occupation. The vote was 24 to 1. The measure provides that such leases shall remain in status quo until 90 days after the land board enters an order stating that the cause for suspension has ceased to exist. The measure was scheduled to go to a conference committee.

INDIANA

ADMINISTRATOR ICKES last week expressed the hope that Indiana would enact a proper oil-conservation law at the earliest opportunity. The hope was expressed in a letter to Hugh A. Barnhart, director of the state's Department of Conservation, who had written the administrator to advise him of the recent failure of the Indiana general assembly to enact legislation providing for the regulation of the oil and gas industry in the state.

In his reply Mr. Ickes wrote that he found it difficult to understand how those opposed to the legislation had been able to defeat the measure when they had the example of Illinois so close at hand. He pointed out that in the latter state, production went from a little more than 10,000 bbl. daily in early 1937 to more than 500,000 bbl. daily in late 1941, and is now at the way station of 240,000 bbl. daily on a long decline. He predicted that within the brief period of 10-12 years, the Illinois oil industry will have gone from rags to riches and back to rags again.

FOUNDED IN 1910

BY PATRICK C. BOYLE

the OIL AND GAS JOURNAL

From Wells to Stations

THE action of Mr. Ickes in recommending an average minimum increase of 35 cents per barrel in crude-oil price ceiling puts the responsibility of adequate returns to the oil industry for what it is now doing and what it should do in the future, squarely up to the Government.

The recommendation was preceded by an exhaustive investigation on the part of PAW which with its OPC predecessor has had nearly 2 years of practical experience in determining what it takes to find and produce liquid petroleum at a rate of nearly 1.5 billion barrels yearly.

The petroleum agency made a study of every plan that had been suggested for assuring that this nation and its allies will have sufficient oil through this emergency and it came to the conclusion that the only effective method was to continue the historic operating procedure of a free, aggressive, and an efficient enterprise supported by a price commensurate with the job to be done.

Quick and favorable action by OPA or by those officials who have authority over that agency supporting the recommendation of the petroleum administrator, is to be expected.

There can be no excuse for delay. Those who appeared before the legislative investigators last week again went over all the conditions in the exploratory, drilling and producing branch of the industry which make this price action mandatory. The adjustment is more than a year overdue and further postponement will lay the pricing agency open to the charge of insincerity and incompetence.

It is unfortunate that the recommendation did not deal more specifically with the provision that the higher crude-oil schedules must be accompanied with the "necessary equivalent and concurrent adjustments in product prices."

It may have been assumed that the product ceilings would naturally follow the advance in the industry's raw material and nothing more need be said. Past experience with bureaucratic controls lead to the conclusion that this might prove to be a dangerous assumption.

A study of the recent annual reports of those companies engaged in all branches of the oil industry will end any doubt as to the necessity of having product prices reflect in full any upward changes in crude schedules.

The report issued Monday by a nationally and foreign operated company is typical. The Government has called upon it for practically every petroleum war service extending from the fields through pipe lines and refineries to the distribution of products in this country and in North Africa and other war fronts.

Its earnings last year decreased 28 per cent compared to 1941 and represented a return of less than 5 per cent on its invested capital. The number of its employes, with 10 per cent in the military services, decreased 7 per cent but its payroll increased 11 per cent. Most of its other costs were higher. Its sales volume expanded but the returns on sales were less.

The petroleum industry as a unit will not improve its war position should its raw-material prices be advanced without compensating product revisions for its refinery and market operators.

This fact should be made a part of the latest record with all the evidence necessary to assure equitable adjustments in prices from the wells to the civilian and military service stations.

Four Major Problems Confronting Industry Reviewed Before N.P.A.

by J. P. O'Donnell

CLEVELAND, Ohio. — The major problems of the refining division of the oil industry in wartime—aviation gasoline and lubricating oil, manpower, transportation, materials, prices—and the readjustment after the war for which the industry is now preparing shared interest here last week at the forty-second semi-annual meeting of the National Petroleum Association. In deference to an ODT request, member companies were asked to restrict their representation to one or two officials so that attendance was well below normal but virtually every associated company was represented.

H. A. Logan, of the United Refining Co., president of the association, indicated the gravity of the problems facing refiners in his opening remarks. He cited the problems of crude shortages which are beginning to be felt in Pennsylvania and have been felt in District 2, of transportation for which he saw no permanent solution till the war's end, of manpower which is being felt acutely by the refining division and of unbalanced demand due to war requirements which is causing stocks of non-war products to rise to burdensome heights.

Edwin A. Cumming, director of the PAW Refining Division, foresaw a desperate need for aviation gasoline in the next few months and said that refiners have a great responsibility to get their plants in operation as quickly as possible. Earlier he had told the association that the aviation-gasoline record in 1942 was phenomenal, that production had doubled then and would double again in 1943. He credited much of the gain to trifles, improvements in technique and more efficient use of existing equipment. This year he expects the construction program already undertaken to be completed, half of it by July. By the end of the year, he said, 120 refineries will be making components of 100 or 91-octane gasoline with the latter in increasing use because of the disparity between production and anticipated requirements.

The big development in 1942 was the construction of catalytic-cracking plants, Mr. Cumming said, but he predicted that great strides in technique would be made in 1943 and 1944 because of the room for improvement. One of the needs of the refining division, he said, was simplification, citing the fact that there are, for instance, eight isomerization processes. The betterment in 100-octane has not been limited to capacity but also includes quality which has improved so much that four bombers now can carry what five carried a year ago.

Mr. Cumming predicted that domestic crude-oil runs would approximate 4,000,000 bbl. per day by the end of this year, an increase of 10 per cent, with about 3,000,000 bbl. being processed in refineries making critical products, leaving only 25 per cent of the aggregate for nonessential products. He qualified this with the phrase "if we can get the crude." He said that District 2 requirements are now greater than available supplies. Refineries will probably have to process sour crudes, particularly from West Texas, and he advised refiners to study their plants now in preparation for the day when they will have to run such stocks.

E. A. Cumming, PAW director of refining, predicted that refinery runs will rise to 4,000,000 bbl. daily by the end of this year

W. M. Holaday, chief of the aviation section of the PAW Refining Division, contrasted the aviation-gasoline picture with that of aviation lubes which must be made with existing equipment. This will require ingenuity on the part of the operator and the industry he said in directing oil from nonessential to essential uses, practicing interplant blending, transfer of preferred crudes to plants which can process them more efficiently and the elimination of bottlenecks in units now in operation. He said that the impending "freeze order" on aviation lubes would probably not be invoked for some time, depending on the industry's ability to supply requirements and provide for the stock-piling program. This program entails the building of a stock pile equivalent to 4 months' production at the rate that obtained in January and February. It has been delayed by lack of tankage, lack of money to buy the oil and transportation difficulties.

Additives Limit Production

While badly needed heavy-duty oils are made from the same fractions normally as aviation lubes, Mr. Holaday expressed the opinion that these cuts should be conserved for aircraft service. The chief limitation on the production of heavy-duty oils, he said, is the availability of additives and, it is expected, the capacity for their production will be expanded. Some degree of flexibility in their use has been attained so that if a shortage occurs in one, another may be substituted. This is a potential difficulty since additive manufacturers can be guaranteed of their supply of chemicals for a period of only 6 months. In the future, the burden of having the additive approved rests with its manufacturer and not with the refiner.

F. A. Watts, director of PAW's Materials Division, described the Controlled Materials Plan as it affects refiners. He said that, as amended April 1, it was hoped that the preference level of P-98-b will be maintained high enough that the industry will not require another order. He discussed the operation of CMP under which PAW is the claimant agency for oil. In projecting demands he cautioned against any excess and emphasized the acute need for repair and rehabilitation whenever possible.

R. L. Minckler, PAW director of petroleum supply, expressed the belief that the war would have been over and we would have lost had not rationing and the elimination of functional inefficiencies prevented a short-

age of 1,000,000 bbl. a day on the East Coast. These steps made possible the shipment to Europe of a large volume of oil and if it had been one-half to two-thirds less we could not have carried on. He said that these steps gave Hitler the worst defeat he has had so far.

Dr. Frederick H. Harbison, PAW labor counsellor, summarized the manpower problem as follows: There are 22,000,000 males between the ages 18 and 38 and 50 per cent will be in the armed forces within a year. Since 14,000,000 will be physically fit, only 3,000,000 of the latter will remain in industry and fully half of that group will be in agriculture so that actually there will be but 1,500,000 available to industrial companies. He said that the first problem of refiners was to retain the 15 per cent in that age group that will be deferred and the second problem is the training of replacements. The only assured method of attaining the first is by acceptance of the replacement schedule which he urged the industry to adopt since it assures deferment. He was emphatically in favor of the industry adopting this plan on a nation-wide basis in the belief that if it is the first to do so it will receive the most consideration.

Paul Ryan, chairman of the PIWC subcommittee on postwar readjustment, asked that a realistic attitude be taken toward the after-war period. While the externals are changed as a result of war bringing about a higher standard of living through labor, time and space-saving devices, the fundamentals will remain the same. He said that his committee is studying postwar problems from three standpoints:

1. The relation between government and industry.
2. The oil industry's relations with other industries and its own inter-company relations.
3. The problems of the individual companies.

Importance of the first consideration is apparent from the tremendous growth of government interest in industry. He said that the book value of United States industry increased from $22,000,000,000 to $40,000,000,000 in 1942. Of this increase 3½ billion was provided by private capital and 14½ billion by government. He proposed as the first postwar job the liquidation of the Government's holding in business.

Robert H. Collacott, head of OPA's refined-products section, petroleum branch, said that one of two conditions are necessary to warrant price advances, either the industry must be essential to war or its loss would result in hardship. He said that the latter was hard to define but the hardship must be sufficient to make supplies for essential needs impossible. He asked his audience to be sincere and consistent in the criticism of OPA policies.

Federal Order Digest

PAW Regulations

Secondary Recovery—PAO 11, SO 6: Authorizes use of material for secondary-recovery operations on properties where such operations were actually being conducted on March 30, 1943. Supplementary order extends time in which to secure clearance on material for operations which will extend beyond June 30, effective April 12.

Appointments—L. E. Fleming, general manager of transportation for Standard Oil Co. of California, to be director of transportation in PAW District 5; Otto D. Donnell, president, Ohio Oil Co., to be chairman of general industry committee, PAW District 2, succeeding Frank Phillips, resigned.

OPA Price Orders

Crude Oil—RPS 88, Amendment 93 (correction on amendment number): Extends previous advances ranging up to 25 cents per barrel in 20 California fields to state-wide basis, effective April 12.

Steel Drums—RPS 43, Amendment 3: Specifies maximum prices for used steel containers apply to sales by emptiers to any purchasers, effective April 22.

Conversion Grates — MPR 236, Amendment 2: Sets specific dollars-and-cents ceilings for recently developed rectangular conversion grates used in converting heating plants from oil to coal, effective April 23.

OPA Rationing Orders

Gasoline—RO 5c, Amendment 41: Provides means for motorists to qualify for mileage rations who fail to meet tire-inspection deadline, providing they can present valid reason, effective April 22.

Range Oil—RO 11, Amendment 60: Authorizes supplementary rations of range oil or kerosene to householders preserving foodstuffs, effective April 19.

Gasoline—RO 5c, Amendment 40: Removes Sharon, Sharpsville, Farrell and Wheatland, Pa., and Bluefield, Va., from the eastern gasoline shortage area, because of their border-line locations, effective April 19.

Judgment—Washington, D. C., District Court refused to set aside gasoline-rationing suspension order, issued by OPA, marking first test of such authority. Station operator's plea for injunction denied April 15.

Re-refined Oil—RO 11, Amendment 56: Exempts re-refined lubricating oil from fuel-oil rationing regulations, to encourage burning of such product as substitute for residual types, effective April 6.

WPB Regulations

Pipe Fittings—LO L-288: Combines control of gray cast iron, malleable iron and brass and bronze fittings under single order, instead of under Schedule 2 of LO L-42, which is revoked and is incorporated without modification in new order, effective April 17.

Power Truck Tires — M-15-g, amended: Extends the replacement for use period on application for new power-truck tires from 15 to 30 days, issued April 12.

Antifriction Bearings—GPO E-10: Establishes additional controls over scheduling the production and distribution of antifriction bearings, supplements M-293, effective April 13.

Transportation—PRO P-142, amended: Provides for a steady flow of materials entering into the operations of transportation systems during the time required for the changeover from P-88, issued April 14.

Liquid Pumps—GLO L-246: Modifies controls on the production and distribution of liquid pumps; restricts manufacturers and dealers from accepting other than approved orders, effective May 12.

Coal Stokers—GLO L-75, Interpretation 1: Defines Class A stoker as one having a grate area of 36 sq. ft., or less, and coal-feeding capacity in excess of 60 lb. per hour, issued April 13.

Copper Wire Mills—CMPR 1, Direction 3: Prevents displacement of products approved by WPB for April delivery in mill-production schedules by any other orders, issued April 9.

Brass Mills—CMPR 1, Direction 4: Prohibits displacement of products approved by WPB for April delivery in mill production schedules by any other orders, issued April 9.

Copper and Zinc—PRO P-134: Revokes P order to prevent confusion with CMPR 5, covering preference ratings for the acquisition of necessary repair and maintenance materials by producers of copper, zinc and alloys of these metals, effective April 15.

Questionnaire Forms — Manufacturers working on principal war contracts will receive new form combining two previous questionnaires designated as WPB 732 and CMP-7, effective on receipt.

Appointment — Arthur D. Whiteside, president of Dun and Bradstreet, made vice chairman of WPB in charge of civilian requirements, reporting direct to Donald M. Nelson, effective April 15.

Panel of experts at the "Information Please" session held Friday morning as part of the N.G.A.A. program. Left to right across both pages are: A. J. L. Hutchinson, Fluor Corp.; R. P. Mase, Frick-Reid Supply Corp.; M. F. Kotzebue, Gasoline Plant Construction Corp.; R. H. Newton, Houdry Process Corp.; M. M. Perkins, M. W. Kellogg Co.; C. H. Barrere, Lummus Co.; A. E. Buell, Perco division, Phillips Petroleum

N.G.A.A. Discusses Manufacture of Components for Aviation Fuel, Rubber

The meeting of the Natural Gasoline Association of America last week at Dallas was one of the most important of the year as much of it was directly concerned with the manufacture of vital war products. Papers not discussed in this report were published in full in the April 15 issue of The Oil and Gas Journal along with Journal's annual surveys of natural-gasoline plants and condensate-recovery operations. Two technical papers by R. C. Alden and N. C. Turner will be published April 29.

by Harry F. Simons

DALLAS, Tex.—In a distinctly aggressive atmosphere, the Natural Gasoline Association of America met here last week for its twenty-second annual session to consider not only vital war products which it can and is supplying but the postwar fuel requirements of the nation. Much of the program was devoted to discussion of the manufacture of components essential to supplying the demand for fighting-grade aviation fuel and the rubber program. The meeting was unusually well attended, over 400 being registered.

The tone of the meeting was epitomized by the statement of Justin Wolf, assistant chief counsel of PAW, who remarked near the close of the "Information Please" session that "There has been a remarkable change since last year when I attended the Tulsa meeting. The spirit of gloom in evidence there has changed to one of determination within the natural-gasoline industry to take care of itself." He added that during the year, natural-gasoline industry had come to be highly regarded by those in the Government who have learned they can depend on it. "It is evident from this meeting," said Mr. Wolf, "that the natural-gasoline industry is looking years ahead and it is a real tribute to the industry that it is doing so."

"Information Please" Lively Session

The most interesting meeting on the program was the concluding session titled, "Information Please," in which a panel of 13 experts answered questions submitted from the floor through interlocutor D. E. Buchanan, director of PAW District 3. At times

New officers of the N.G.A.A. chosen at the Dallas meeting last week: H. W. Beeson, Sabine Valley Gasoline Co., Shreveport, La., vice president; H. A. Ells, Cities Service Oil Co., Bartlesville, Okla., vice president; C. R. Williams, Chicago Corp., Corpus Christi, Tex., vice president of the high-pressure gas division, and James Vaiden, Skelly Oil Co., Tulsa, president. R. A. Carter, Continental Oil Co., Ponca City, Okla., also a vice president, was unable to attend the meeting

Co.; N. K. Rector, Petroleum Engineering, Inc.; Henry Wade, Parkhill-Wade; R. C. Fish, Stearns-Roger Manufacturing Co.; Justin Wolf, assistant counsel, PAW; P. M. Raigorodsky, assistant director, and Frank Dotterweich, technical advisor, PAW Gas and Gasoline Division

men in the audience volunteered to answer questions which stumped the experts or added to the answers given by the panel.

Experts on the panel included: A. J. L. Hutchinson, Fluor Corp.; R. P. Mase, Frick-Reid Supply Corp.; M. F. Kotzebue, Gasoline Plant Construction Corp.; R. H. Newton, Houdry Process Corp.; M. M. Perkins, M. W. Kellogg Co.; C. H. Barrere, Lummus Co.; A. E. Buell, Perco division, Phillips Petroleum Co.; N. K. Rector, Petroleum Engineering, Inc.; Henry Wade, Parkhill-Wade; R. C. Fish, Stearns-Roger Manufacturing Co.; Justin Wolf, assistant chief counsel of PAW; P. W. Raigorodsky, assistant director of the Natural Gasoline Division of PAW, and Frank Dotterweich, technical advisor to PAW.

Most of the questions concerned the details of costs and methods for manufacturing at gasoline plants the products required by refiners for fighting-grade aviation gasoline or the direct manufacture of this grade of fuel at the existing gasoline plants. Raw materials for the rubber program were also discussed.

One question that kept coming back in different forms was the disposition of the 15,000 bbl. of propane available at plants in the East Texas field. This material is important in the manufacture of ethylene and acetylene but at the present time there is no market for the propane in East Texas. It is probably cheaper to ship the propane to points where it can be used than it is to install a plant and ship the products from it. It was suggested that the best thing to do with the propane was to use it as a liquefied gas. When the necessary steel becomes available an $8,000,000 plant, if constructed, would permit the manufacture of acetylene at a price competitive with the present electric process.

The experts brought out that small cracking plants with 650 bbl. per day capacity can be constructed for approximately $425,000 and that they have a low operating cost. An isomerization plant for the manufacture of approximately 1,000 bbl. of isobutane daily can be built for a capital investment of around $250,000 with the operating cost of $0.01 to $.015 per barrel, average cost for such plants is around $200 per barrel.

Increasing importance of hexane from which isohexane and neohexane can be obtained to make a lower vapor-pressure engine fuel was discussed by the experts. Plants for the manufacture of this material are practical at this time.

Aviation base stocks can be made from the products of the natural-gasoline plants, followed by catalytic cracking, polymerization, gas reversion, and polyforming. Also some distillates can be converted directly into aviation fuel by alkylation without cracking. Two other vital products can be made by shifting the operations slightly. As sulfur content affects adversely the lead susceptibility, operators were urged to use adequate sweetening treatments.

The question of what motor fuel would be like after the war brought interesting discussion from the panel and the floor. One speaker pointed out that it may be necessary to redesign engines to include fuel-injection systems. The solid fuel injection gets away from extremely high octane requirements and from the vapor-lock problem.

Propane as a motor fuel was dis-

Left: Ray E. Miller, Hanlon-Buchanan, Inc., retiring president of the Natural Gasoline Association of America, receives a watch in appreciation of his services to the organization. Making the presentation is Ted Goebel, manager of the gas and gasoline division of Shell Oil Co., Inc., Gulf Coast division. Right: Ironing out details of the "Information Please" session are William F. Lowe, secretary-treasurer of the association, and D. E. Buchanan, director, District 3 Petroleum Administration for War, who served as interlocutor for the group

cussed several times during the program and it was pointed out that it results in less engine wear, less lubricating oil and less heat per horsepower developed. Satisfactory storage is the principal drawback.

An interesting prediction (in answer to a question) on the highest absorption pressure to be applied was answered by one expert who stated his work had shown that 2,350 lb. per sq. in. gave the most efficient monetary results on cycling projects.

The paper, "Role of Natural-Gasoline Industry in the 100-Octane Gasoline Program," by Bruce K. Brown, assistant deputy petroleum administrator of PAW, was read by Col. Jacques Morrell, of the chemical warfare branch of the U. S. Army. The paper pointed out that it has become evident that production of fighting-grade gasoline is lagging behind requirements. Of primary importance is the production of isobutane and isopentane with which to make alkylate for aviation fuel. One barrel of increased production of isobutane at the present time can be made ultimately into the equivalent of 4 bbl. of additional 100-octane gasoline, according to the author.

Operators were urged to review existing plant operations to see if changes could be made for increasing the output of these materials. Plans for such changes should be submitted to the Natural Gas and Gasoline Division of PAW. Attention should be paid to the time required as well as to the amount of critical materials necessary. There is assurance of sufficient outlet for isobutane and isopentane of 95 per cent purity to provide for return of investment necessary to make such changes.

Butane Isomerization

Butane can be made into isobutane through the new butane-isomerization process. This is the key to additional supplies of isobutane and 32 of these plants are either under construction or completed with a total capacity of 25,500 bbl. per calendar day. The smallest plant has a design capacity of 68 bbl. per day. Several others are below 200 bbl. per day and the largest is 2,850 bbl. per day.

Of particular note to gasoline-plant owners is that fractionation facilities are a considerable portion of butane isomerization plants. If a "butane splitter" is present or can be justified, enlargement of the project to include normal butane isomerization should be considered.

The per pass conversion in the typical butane isomerization plant is 40 to 50 per cent with an ultimate isobutane yield of 90 per cent or better. Charge stock should be relatively pure normal butane but the presence of propane or isobutane is not objectionable although there is a limiting value because of the effect on catalyst life. About 50 gal. of isobutane per pound of catalyst has been obtained, promoter consumption in most cases is small and operating costs (exclusive of depreciation and royalty) are expected to be under $0.01 per gallon.

"Fractional Analysis by the Mass Spectrometer" was discussed by Dr. O. L. Roberts, Atlantic Refining Co., Philadelphia, Pa., who showed what could be done in identifying hydrocarbons by this method. Another paper on analysis was that presented by N. C. Turner, engineering construction division, Frick-Reid Supply Corp., who discussed "Developments in Analysis of Hydrocarbon Gases by Means of Absorption Fraction." A report on "Normal Butane," prepared

Peterson Given Hanlon Award

FRANKLIN P. PETERSON, Tulsa, retired assistant manager of production, Mid-Continent Petroleum Corp. was selected for the Hanlon Award presented annually by the Natural Gasoline Association of America at its meeting at Dallas last week. The Hanlon Award is the highest honor conferred by the natural-gasoline industry.

Mr. Peterson's biography is almost a history of the natural-gasoline industry from its inception as he started making gas engines near Pittsburgh, Pa., in 1907 and a year later joined the Bessemer Gas Engine Co. His first visit to a natural-gasoline plant was in 1909.

Impressed by the operation, Mr. Peterson began experimenting to determine the quality of gas best suited to gasoline manufacture and before the end of the year he had worked out a crude method for testing "wetness" of gas. He improved on the method and a year later wrote a booklet describing the method which used miner's lamp oil for absorption oil and combined these results with specific-gravity determination to ascertain liquid content. He came within 25 per cent of being correct, which was close enough for that time.

Mr. Peterson became concerned with the large volumetric losses during the then prevalent weathering operation and purchased a plant in 1911 to carry out experiments directed at correcting this situation. He was able to liquefy propane and butane using ice as a refrigerant. He built a double-walled condenser pipe

FRANKLIN P. PETERSON

in which he expanded residue gas to absorb heat from the compressed casinghead gas as it passed countercurrent through the inner pipe. As a result of this work he obtained the first patent for the liquefaction of natural gas by pressure fractionation. The same year he applied for a patent on a multiple-stage-condensation method of producing stable gasoline and liquefied petroleum products.

Having produced liquefied petroleum gas, Mr. Peterson immediately saw a great future for the product and applied for a patent in which he described it as "a composition of matter comprising a new commercial product, gaseous at normal temperatures and atmospheric pressure, but capable of being liquefied and thereafter held in containers in the form of liquefied gas at normal temperatures and under pressure practicable for storage and transportation purposes." Before the patent had been issued, Mr. Peterson was operating an automobile with a mixture of butane and propane for fuel.

Failure of L.P.G. to become popular at that time caused Mr. Peterson to move to Oklahoma where he became associated with Mid-Continent Petroleum Corp. Nearly 20 years ago he authorized the installation of a low-temperature-fractionating column in the Mid-Continent plant at Cromwell. He is credited with being the father of the L.P.G. industry which moves 600,000,000 gal. of material to market annually.

by R. C. Alden, Phillips Petroleum Co., was read by Ted Legatski of that organization.

"The Distillate Industry in the War Program" was discussed by J. R. Butler, Cotton Valley Operators Committee, who pointed out that the credit for making unitization a common term in the oil industry must be given to distillate operators. Unit operation in connection with pressure maintenance, he said, reduces the steel required to produce a barrel of war products. The distillate industry is producing isobutane and isopentane for aviation gasoline, toluene and butadiene and has played an important role in the conversion of used material and equipment to war needs.

Committee reports were submitted to bring members up to date on the association's research programs. The committee headed by H. A. Montgomery, Hanlon-Buchanan, reported that the project to improve the reproducibility of low-temperature-fractional analysis was proceeding and that an additional sample had been analyzed by the participating laboratories. Progress on the study of plant control tests for the determination of sulfur compounds in liquefied petroleum gases was reported by H. H. Beeson, chairman of the technical committee. This project is continuing. The technical committee also announced publication and issuance of the association's book of standards.

D. A. Sillers, Lone Star Gas Co., reported on the results obtained with a simplified device for determining the specific gravity of two-phase gases. This apparatus was first tried out at the association-sponsored tests near Corpus Christi and has since been improved.

New officers selected at the meeting to serve for the ensuing year are: James W. Vaiden, Skelly Oil Co., Tulsa, president; H. H. Beeson, Sabine Valley Gasoline Co., Inc., Shreveport, La.; H. A. Ells, Cities Service Oil Co., Bartlesville, Okla., and R. A. Carter, Continental Oil Co., Ponca City, Okla., vice presidents. C. R. Williams, Chicago Corp., Corpus Christi, Tex., was elected vice president of the high-pressure division.

Ninth Tanker Launched In Atlantic Program

PHILADELPHIA, Pa. — The oil tanker S.S. Atlantic Coast, ninth vessel in the current building program of the Atlantic Refining Co., was launched April 8 at the yard of the Sun Shipbuilding & Dry Dock Co., Chester, Pa. Its delivery shortly will complete planned constructions for the company.

The newly launched vessel is a sister ship of the S.S. Atlantic States, which went down the ways several months ago. These ships are of the fastest, most modern type of tanker.

Supply Men Elect New Officers

THE Natural Gasoline Supply Men's Association held its annual meeting in conjunction with the Natural Gasoline Association of America and voted to extend its activities for another year. Also discussed was the question of limitation of membership but decision was reached to put no limit on it. New members accepted into the association were announced.

Officers for the coming year were chosen by the directors as follows: Charles D. Peterson, Fisher Governor Co., president; A. M. Buxton, Cooper-Bessemer Corp., first vice president; J. A. Knebel, Joseph A. Coy Co., second vice president, and V. C. Canter, Frick-Reid Supply Corp., treasurer.

Directors chosen for 2-year terms were A. M. Buxton, V. C. Canter, R. E. Walker, American Rolling Mill Co.; Fred J. Wetzel, Ingersoll-Rand Co.; Charles D. Peterson and George W. Probst, Clark Brothers Co., retiring president.

Holdover directors who have 1 more year to serve are: L. J. Griffey, Hanlon-Waters, Inc.; J. A. Knebel, Warner Lewis, Warner Lewis Co.; C. S. Simon, Midwest Piping & Supply Co., and Paul C. Wallack, Walco Engineering & Construction Co.

Officers for the ensuing year elected by the Natural Gasoline Supply Men's Association and the retiring president: J. A. Knebel, Joseph A. Coy Co., second vice president; A. M. Buxton, Cooper-Bessemer Corp., first vice president; V. C. Canter, Frick-Reid Supply Co., treasurer; Charles D. Peterson, Fisher Governor Co., president, and George W. Probst, Clark Bros. Co., retiring president, all of Tulsa

New California Oil Order To Liberalize Restrictions

WASHINGTON, D. C.—PAW will issue probably late this week Revised Supplemental Order 4 to PAO 11, setting up new controls over drilling and use of materials for producing operations in California.

Order will establish patterns for well spacing in various types of fields and specific drilling restrictions will be listed individually for the most important fields.

The new order is understood to be more liberal than previous regulations and to permit more drilling with less paper work in obtaining priorities, and is aimed at getting greater production of oil with most efficient use of steel.

Within the rules and principles laid down by PAW, the District 5 director will have virtual autonomy in issuing drilling permits and priorities, and few applications will have to be passed on in Washington. This is first step toward PAW's desire to decentralize its operations and may be followed in other districts. The California plan was worked out by District 5 committees and has been under study by PAW for many weeks.

May Production Quota Raised to 4,237,400 Bbl. Daily

WASHINGTON, D. C. — PAW April 19 certified a production rate of 4,237,400 bbl. daily of all petroleum liquids during May, an increase of 51,300 bbl. over April and compares with 3,773,200 bbl. daily in May 1942. The individual state rates changed little from April except Texas, up 60,000 bbl. to meet WEP requirements at Longview.

Standard of Jersey Offers Government Its Patent Rights on Buna-S

NEW YORK. — A highly unusual offer has been made to the United States Government by Standard Oil Co. (New Jersey) "in order to give the greatest possible impetus to the wartime rubber program." Last Thursday the company offered to transfer permanently to the Government through Rubber Reserve Corp. its patent rights on buna-S. It was reported that Jeffers and Rubber Reserve have accepted. Under the proposal the Government will have a free license for itself not only during the war but for the entire life of the patents; it will have the right to issue royalty-free licenses to everyone who cooperates with the government program and reciprocates with similar licenses under its own patents; there will be no payment to Standard for the rights and the Government is to increase its expenditure on synthetic-rubber research to not less than $5,000,000. Standard's purposes in making the offer were:

1. To give every possible incentive to cooperation in the war rubber program.

2. To remove concern about post-war patent situation from any who may have a contribution to make.

3. To encourage American research and ingenuity to build a new industry.

4. To continue to do everything it can to assure tires for America's cars always.

In acknowledging receipt of the offer, Mr. Jeffers said: "Your proposal is very definitely in the public interest and this is an eminently propitious time to make this offer. . . . I earnestly hope that your example will lead others to join promptly in this effort."

It is estimated that 100 patents are involved, some of which were part of patents purchased from Farbenindustrie in 1929 at a cost of $35,000,000. The magnitude of the offer is apparent from the fact that 705,000 of the rubber-program total of 813,000 tons is buna-S.

PAW Frees Materials For Secondary Recovery

WASHINGTON, D. C.—Use of material for secondary-recovery operations by means of artificial water, gas, or air drive on any oil lease or property on which such operations were actually being conducted on March 30, 1943, was authorized last week by the Petroleum Administration for War.

The authorization was contained in Supplementary Order 6 to Petroleum Administrative Order 11 and will continue in effect until June 30, 1943.

As a result of the issuance of Supplementary Order 6, however, operators now will have approximately 3 months in which to secure clearance for the use of material in secondary-recovery operations which will extend beyond June 30.

Suman Heads General Committee on A.P.I. Meeting

HOUSTON, Tex.—John R. Suman, vice president of Humble Oil & Refining Co., Houston, Tex., has been named chairman of the general committee on arrangements for the spring meeting of the southwestern district, A.P.I., Division of Production, to be held in Houston April 29 and 30.

The preliminary program follows:

Thursday, April 29

Morning Session, 10:30 a.m.:

Report from Southwestern District Chapter Officers on Past Year's Activities: L. P. O'Neill, chairman, East Texas; C. F. Patterson, chairman, North Texas; A. W. Baucum, chairman, Houston, and T. W. Johnson, chairman, Ark-La-Tex.

Petroleum Transportation in Central and Eastern United States, T. E. Swigart, Shell Pipe Line Corp., Houston, Tex.

Afternoon Session, 2 p.m., Materials:

A.P.I. Standardization Program in the War Effort, J. F. Lucey, Lucey Petroleum Co., Dallas, Tex.

Controlled Materials Plan, D. G. Hawthorn, chief of equipment section, Production Division, PAW.

Symposium on Materials: (a) J. B. Martzel, United Gas Pipe Line Co., Shreveport, La.; (b) A.P.I. Cooperation in Steel Conservation, C. A. Dunlop, Humble Oil & Refining Co., Houston; (c) Use of Materials in Secondary Recovery, Paul D. Torrey, 229 Shell Building, Houston, and (d) Removal of Paraffin in the University Oil Field, Benjamin C. Craft, Louisiana State University, Baton Rouge, La.

Friday, April 30

Morning Session, 9 a.m., Drilling and Production Practices:

Reservoir Performance, S. E. Buckley, Humble Oil & Refining Co., Houston.

Katy Recycling Project: Plant Operation, Frank D. Noble, Humble Oil & Refining Co., and Field Operations, (Speaker to be announced).

Afternoon Session, 2 p.m., Manpower:

Manpower Needs of Oil and Gas Industry.

Manpower From the Standpoint of Government, Henry LeBlanc, acting regional director, Region 10 of the Manpower Commission, Dallas, Tex.

Protection of Petroleum Facilities in Wartime, movie and discussion, Kraus Earhart, PAW, Houston.

Utilization of Existing Vocational Training Methods for Wartime Conditions in the Oil Industry, J. R. D. Eddy, State Department of Education, Austin, Tex.

DEATHS

Edmund Burke, 65, industrial engineer, died in Chicago last week. Mr. Burke built and operated the electric-power plant at the St. Louis World's Fair in 1904. He went to Chicago in 1910 and was employed by Crane Co. until 1940, when he founded Edmund Burke Engineering Sales Co. His widow and a son survive.

Henry Lockhart, Jr., a director of Shell Union Oil Corp. since its organization in 1922, died April 14. Mr. Lockhart had been interested in Union Oil Co. of Delaware which, in 1922, was combined with certain Shell interests in the United States to form Shell Union Oil Corp.

G. W. Storms, oil producer, died April 11 at his home in Allentown, N. Y. Mr. Storms owned oil property in the Bradford and Bolivar fields. His widow and two daughters survive.

Harry B. Pees, 71, a retired drilling contractor, died last week at his home in Tulsa. He had been a resident of Tulsa since 1907. His widow and a daughter are among the survivors.

Erastus G. Williams, 80, oil producer of Bolivar, N. Y., died last week. He had been associated with the oil business since early manhood, starting as a teamster, then becoming a well shooter and forming Williams Torpedo Co., in which he was active for many years.

George Francis McAuliffe, 63, of Eldred, Pa., died last week in a Bradford, Pa., hospital. Death followed a lingering illness. Mr. McAuliffe had been an oil-field worker in the Bradford area for some years.

William C. Whitehead, 69, retired independent oil operator, died April 14 at his home in Houston, Tex. Mr. Whitehead, a native of Georgia, went to Houston in 1914. He leaves his wife, a daughter and three sons. He was a member of Montgomery Lodge 25 Masons.

Judson Churchill Welliver, 72, director of public relations for Sun Oil Co., Philadelphia, Pa., since 1931, died last week after a brief illness. During 1920 Mr. Welliver served as director of publicity for Warren G. Harding's campaign and later served on the secretarial staffs of Presidents Harding and Coolidge. For 2 years he was director of public relations for American Petroleum Institute.

Ernest Wood, 58, operator of a hydraulic casing-pulling company and contractor for a number of major oil companies, died at Shawnee, Okla., last week.

Liddell A. Rutledge, 48, electrical superintendent for Standard Oil Co. of Louisiana for 25 years, died at Sunset, La., last week. Mr. Rutledge had lived in Shreveport for a number of years. His widow, a son and a daughter survive.

M. C. Nobles, who is credited with discovering the Panhandle oil and gas field of Texas, died last week. In 1916 Mr. Nobles pioneered the first test well, which was completed in 1918 for 10 million cubic feet of gas. Cost of the first well was $70,000, and it was drilled in northwestern Potter County.

Treatment of Boiler Water

*by W. A. Tanzola**

While the problems encountered in cooling-water systems fall into the three general classes of scale formation, corrosion and biological fouling, they vary widely in their complexity and method of solution. Close cooperation between the plant engineer and the supervising water engineer will lead to proper and economical solutions.

THE problems encountered in cooling-water systems fall into three classes—scale, corrosion and biological fouling. The difficulties arising from these problems are well known resulting primarily in impediment of heat transfer, reduction of carrying capacity of the system, weakening and possible failure of the equipment. The necessity for competent water treatment to correct these problems is well recognized. Water-treatment consultants have made considerable advancement in the development of corrective methods and chemicals to overcome these difficulties.

In speaking of deposits found present in cooling-water systems, it is pertinent that the mechanisms causing the deposit formation be borne in mind to distinguish deposits resulting from scale, deposits resulting from corrosion and deposits resulting from organic growths. In general, the term scale formation applies to deposits which result from crystallization or precipitation of salts from solution. Wasting away of metal is a result of corrosion and the products of corrosion may subsequently give rise to a deposit. While a deposit results in both cases, the mechanism of formation is different and corrective measures necessary to prevent the deposit differ widely.

Scale Formation—The type of scale most commonly encountered in cooling-water systems consists principally of calcium carbonate. Calcium and magnesium silicate and less frequently calcium sulfate may form a large portion of the deposit. In special cases scale formation consisting primarily of iron oxide may result from use of well waters high in ferrous bicarbonate. Typical scale analyses are illustrated in Table 1.

The formation of calcium carbonate scale by virtue of an increase in temperature may be illustrated by the following equation:

(1) $Ca(HCO_3)_2$ + Heat →

Calcium bicarbontate

$CaCO_3$ + CO_2 + H_2O

Calcium carbonate · Carbon dioxide · Water

Calcium carbonate, formed by the thermal decomposition of calcium bicarbonate, is more insoluble than calcium silicate and calcium sulfate and therefore should be expected to be found more frequently in scale.

The factors affecting scale formation are temperature or rate of heat transfer, calcium, magnesium, silica, sulfate and alkalinity concentrations and more pertinent—pH value. By means of Langelier's equation, which takes into consideration pH, calcium, total alkalinity, dissolved solids and temperature, it is possible to predict with a remarkable degree of accuracy whether a water is scale forming with respect to calcium carbonate. In the case of calcium and magnesium silicates and calcium sulfate, prediction of scale formation in these forms cannot be made with as great a degree of accuracy.

TABLE 1

Typical Analyses of Scale Samples From Cooling-Water Systems

Source	Condenser (%)	Pipe cooler (%)
Calcium oxide as CaO	49.79	39.85
Magnesium oxide as MgO	2.42	2.20
Iron and aluminum oxides as R_2O_3	0.82	7.50
Organic matter and oil	6.05	15.00
Carbon dioxide as CO_2	39.00	30.20
Sulfates as SO_3	1.29	0.50
Silica as SiO_2	0.15	3.85

The problem of scale formation in cooling-water systems of the once-through type and in closed systems where no evaporation and therefore no concentration takes place is not generally serious. In general, the prevention of scale formation in these systems is readily controlled. In systems of these types calcium and magnesium silicate and calcium sulfate scale formation is rare and the more unstable calcium bicarbonate and in special cases ferrous bicarbonate are the principal offenders.

In recirculating systems where the water is concentrated by evaporation the problem of scale formation becomes more difficult. Not only is the tendency toward calcium carbonate scale formation greater but the problem is intensified by the necessity to avoid exceeding the solubility of calcium and magnesium silicates and calcium sulfate.

While evaporation loss will cause concentration, the natural windage loss will tend to limit concentrations. When the natural windage loss is insufficient to limit concentrations to the desired point, it is necessary to supplement the windage loss by blowdown. The relationship between evaporation loss, cycles of concentration, and windage loss is illustrated by the curves shown in Fig. 2. In the use of these curves, the windage term includes any supplementary blowdown or leakage from the system.

The prevention of scale formation in cooling-water systems is primarily accomplished by controlled blowdown and by the use of surface active materials which possess the property of preventing crystal growth and there-

*Chemical engineer, W. H. & L. D. Betz.

fore scale formation. In effect these materials broaden the solubility of the scale-forming salts. The property of permitting an oversaturated condition without crystal growth and resulting scale formation is possessed to varying degrees by special types of phosphates, tannins, lignins, starches and combinations of these materials.

It is possible to select a particular blend of the various surface-active agents to secure the additive benefits of each for the conditions in question. While it is not possible, and in most cases is undesirable, to prevent crystal growth and precipitation completely, the characteristics of the resulting precipitate can be controlled by proper selection of treatment to secure maximum fluidity of precipitates with the least possible tendency toward adherent scale formation.

Supplementary Treatment

Where the degree of oversaturation develops beyond the effective range of these special surface-active materials, it may be necessary to employ a supplementary treatment such as external softening of the lime-soda or zeolite types or reduction of alkalinity by means of acid treatment. The choice of which one of these methods to employ will depend on the characteristics of the water, the particular mechanical and cooling conditions at the plant and the economics involved.

The treatment with lime and soda ash is illustrated by the following equations:

(2) $Ca(HCO_3)_2 + Ca(OH)_2 \rightarrow$
Calcium bicarbonate — Calcium hydroxide

$2CaCO_3 + 2H_2O$
Calcium carbonate — Water

(3) $MgSO_4 + Na_2CO_3 +$
Magnesium sulfate — Sodium carbonate

$Ca(OH)_2 \rightarrow Mg(OH)_2 +$
Calcium hydroxide — Magnesium hydroxide

$CaCO_3 + Na_2SO_4$
Calcium carbonate — Sodium sulfate

The calcium carbonate and magnesium hydroxide formed in these reactions are insoluble and are either permitted to settle out of solution by retention, or removed by filtration. Where the silica content of the water is sufficiently low, so that magnesium silicate deposition is not a problem, it is not necessary to remove the magnesium and softening is conducted for calcium bicarbonate removal only.

In the case of zeolite softening the following reactions are involved:

(4) $Ca(HCO_3)_2 + Na_2^- \rightarrow$
Calcium bicarbonate — Sodium zeolite

$2NaHCO_3 + Ca^-$
Sodium bicarbonate — Calcium zeolite

(5) $MgSO_4 + Na_2^- \rightarrow$
Magnesium sulfate — Sodium zeolite

$Na_2SO_4 + Mg^-$
Sodium sulfate — Magnesium zeolite

When acid treatment is deemed necessary, sulfuric acid is generally used because it is the cheapest. By use of acid treatment the calcium bicarbonate alkalinity is converted to the more stable and more soluble calcium sulfate as shown by the following equation:

(6) $Ca(HCO_3)_2 + H_2SO_4 \rightarrow$
Calcium bicarbonate — Sulfuric acid

$CaSO_4 + 2CO_2 + 2H_2O$
Calcium sulfate — Carbon dioxide — Water

The conversion of calcium bicarbonate to calcium sulfate minimizes the tendency toward calcium carbonate scale formation as illustrated by Equation (1). The calcium sulfate which forms is considerably more soluble than the calcium carbonate and therefore a greater degree of concentration can be tolerated. The curves in Fig. 1 will serve to illustrate the solubility of calcium carbonate and various forms of calcium sulfate.

The supplementary acid treatment is employed to good advantage in minimizing makeup-water requirements which is essential in certain areas. The savings in makeup water is illustrated in Table 2.

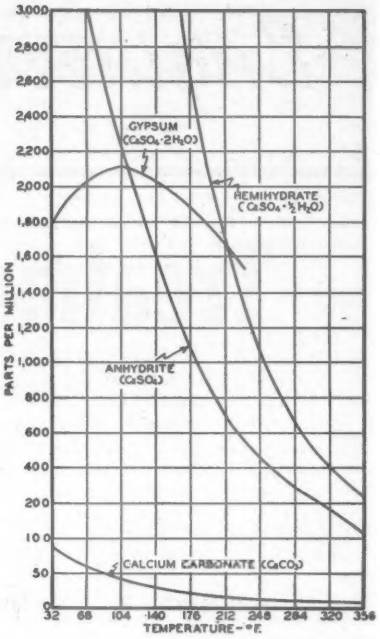


Fig. 1—These curves give the solubility of the pure salts, and these solubilites may be increased or lowered by the presence of other salts in solution and should be interpreted accordingly

It will be noted that makeup requirements were decreased from 225 g.p.m. to 175 g.p.m., a reduction of 22.2 per cent. In addition, although more than double the amount of scale-forming solids was permitted to develop in the circulating water, the amount of scale formed was limited to one-tenth that previously formed.

Corrosion—The factor principally responsible for corrosion is dissolved oxygen. Low pH values caused by

TABLE 2

	Raw water	Circulating water without treatment	Circulating water with treatment*
Total hardness as $CaCO_3$	75	135	510
Sulfate as SO_4	20	60	1,265
Chloride as Cl	100	300	700
Iron as Fe	Trace	Trace	Trace
Alkalinity to phenolphthalein as $CaCO_3$	0	20	0
Alkalinity to methyl orange as $CaCO_3$	200	600	250
pH value	7.1	8.9	7.9
Silica as SiO_2	10	25	75
Calcium as $CaCO_3$	50	65	340
Magnesium as $CaCO_3$	25	65	170
Cycles of concentration	...	3	7

Data

	Without treatment	With treatment
Circulation	6,000 g.p.m.	6,000 g.p.m.
Evaporation loss	2.5% = 150 g.p.m.	2.5% = 150 g.p.m.
Windage loss	0.3% = 18 g.p.m.	0.3% = 18 g.p.m.
Blowdown	57 g.p.m.	7 g.p.m.
Makeup	225 g.p.m.	175 g.p.m.
Cycles	3.0	7

*Water treated with 1.45 lb. of 66 B. sulfuric acid and 0.1 lb. of Oroeol, a blended surface-active product, per 1,000 gal. of makeup water.

carbon dioxide, sulfur dioxide and high concentrations of magnesium chloride often enter the problem. In special cases corrosion may result from ammonia, hydrogen sulfide or directly from sulfate-reducing bacteria which produce sulfides in their life cycle or from iron bacteria which consume iron in their life cycle.

In closed systems where makeup requirements are small, direct correction of the factors responsible for the corrosion is economically feasible, yielding excellent results. In recirculating water systems makeup requirements are considerably higher and the oxygen content of the water is continually replenished by the aeration which takes place in the cooling tower or spray pond and therefore direct methods for the correction of oxygen are not economically feasible. Accordingly, it becomes necessary to use an indirect method which depends upon the maintenance of a "protective film" formation on the metal surfaces to avoid attack. The materials commonly employed to produce protective films include sodium silicate, phosphates, various organic materials, chromates and alkaline materials such as lime, soda ash and caustic soda.

In the application of Langelier's equation for the prediction of calcium carbonate scale formation, if the water is found undersaturated with respect to calcium carbonate it can be expected that the lack of deposition will permit the attack of the metal by dissolved gases. It is therefore necessary to operate with an oversaturated water to permit some deposition. Excellent results in the prevention of corrosion can be obtained with proper control of the quantity and characteristics of the deposition.

The problem of preventing both corrosion and scale formation in a recirculating system becomes increasingly more difficult when a large difference exists between the maximum and minimum temperatures encountered in the system. To assure the maintenance of a protective film on the metal surface at the point of lowest temperature, it is necessary to maintain an oversaturated condition corresponding to the lowest temperature. By increasing the degree of oversaturation at the lowest temperature, to avoid corrosion, an even greater degree of oversaturation will develop at the highest temperature and under extreme temperature difference scale formation may result at the points of highest temperature. Where this condition exists increased rates of circulation to lessen the temperature difference and controlled feed of chemical treatment to the point of highest temperature are steps that may be necessary to avoid excessive scale formation.

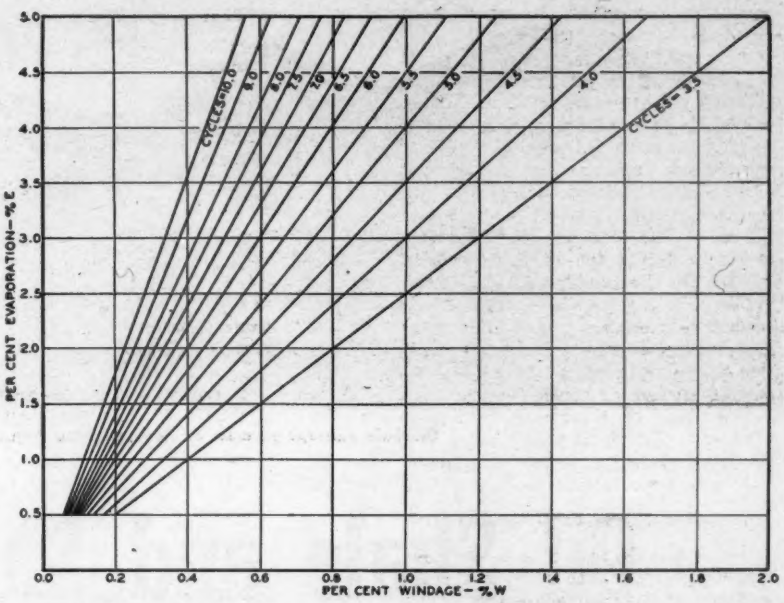


Fig. 2—Note: (1) To determine makeup assume a 1 per cent evaporation loss for each 10° F. drop in temperature through tower. (2) Cycles of concentration can be determined from chemical analysis. (3) Based on evaporation loss and cycles, determine windage loss from curves. (4) From the relation %E + %W = %M.U. (makeup) it is possible to calculate makeup requirements. Example: Temperature of water to tower = 110° F. Temperature of water from tower = 80° F. Rate of circulation = 1,000 g.p.m. Cycles from analysis = 4.0. Then: %E = 3.0, %W (from curves) = 1.0 and %M.U. = 4.0. Daily makeup = 0.04 × 1,000 × 1,440 = 57,600 gal.

Biological Fouling — In industrial cooling-water systems biological fouling in the form of algae and slime growth has become greater with the use of recirculation. Algae growth composed of millions of tiny plant cells, which multiply rapidly and produce large masses of plant material in a very short time, are most familiar to us in the form of the green scum that makes it appearance predominantly in the summer and spring. Slime growths are composed of a dense gelatinous mass of microorganisms, principally bacteria and protozoa with some algae and fungi.

Chemicals Used

The chemicals most generally used to eliminate and prevent slime and algae troubles are those which exert a toxic action upon the causitive microorganisms. Included in this group are chlorine, chloramines, copper sulfate, mercury and other heavy metal compounds, potassium permanganate and chlorinated phenols, such as sodium pentachlorphenate.

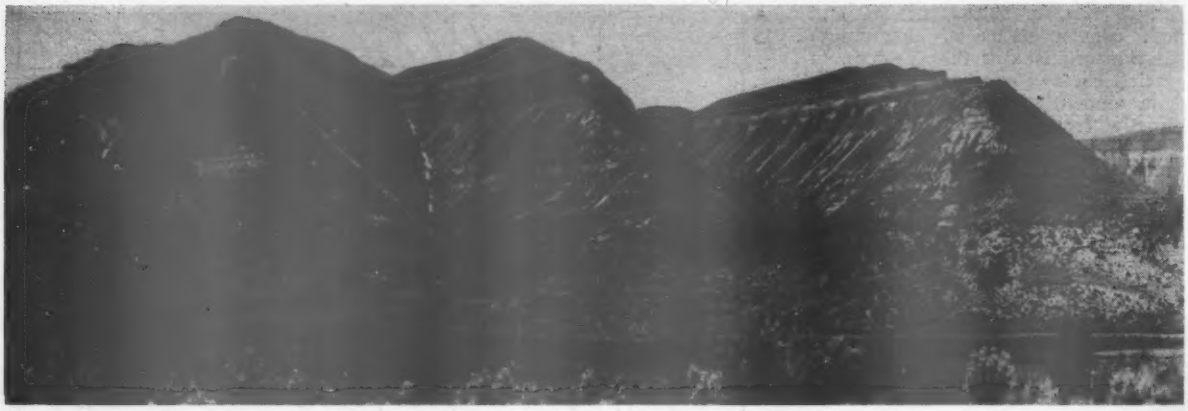
The choice of the proper chemical for any particular problem is dependent upon a number of physical and chemical factors which include: temperature, rate of flow, retention time, aeration, chemical composition of the slime and algae deposits, and of the water to be treated inasmuch as the presence of constituents which might interfere or react with the toxic chemicals may be present. The three most commonly used algaecides are chlorine, copper sulfate and the chlorinated phenols.

Chlorine in its various forms has been widely used. Its toxicity is remarkably high, it acts quickly, is fairly general in toxicity for most bacteria, algae and protozoa, and the maintenance of as little as 0.5 p.p.m. residual will kill most species. In once-through systems, the continuous application of chlorine is generally economically impossible. In such cases intermittent treatment has been used successfully. The use of a relatively heavy dosage over short periods serves to kill and remove any growths which may be formed during the intervals when no treatment is used.

The use of chlorine in recirculation systems is not widely practiced as it is difficult to maintain a residual chlorine content because of loss due to aeration and volatilization. Inasmuch as the most effective types of surface-active agents include the use of organic materials, the oxidizing effect of chlorine on these materials may be a disadvantage.

Copper sulfate has a rather high degree of toxicity to the simplest algae; such as the Cyanophycea, lower for the more highly developed forms of Chlorophycae and generally less toxic to protozoa and bacteria. Inasmuch as the toxic effect of copper sulfate is due to the copper ion, it cannot be advantageously used for slime control in alkaline water as the

(Continued on Page 60)



Oil-shale outcrops on crest of ridge near De Beque, Colo.

Oil Shale and Shale Oil

A Survey—Part 1

by B. H. Weil and Whitney Weinrich*

THE heavy demand for petroleum and its products, occasioned first by the defense program and then by the entry of the United States into World War II, has again focused attention upon the fact that the petroleum reserves of the United States are not unlimited.

Several substances at various times have been proposed as substitutes for petroleum or its products, and many of these substitutes are in use in countries which have never possessed supplies of crude oil at all comparable to those of the United States. These substitutes include motor alcohol, liquid fuels from the high and/or low-temperature carbonization of coal (motor benzene), liquid fuels and lubricants from the hydrogenation of coal, fuels and lubricants synthesized from hydrogen and carbon monoxide (water gas) by the Fischer-Tropsch reaction, and miscellaneous "petroleum products" from shale oil.

None of these substitutes have proved economically acceptable in the United States up to this time, their use being restricted to countries where much higher prices prevail for petroleum products, because of the lack of native supplies, the costs of transportation, tariffs, and the nationalistic desire of self-sufficiency.

While several attempts have been made by agricultural interests to legislate the use of "alkygas," none of these attempts have succeeded, and expert testimony indicates that costs for an alcohol fuel produced in quantity would still approximate $0.30 per gallon, and an alcohol fuel would have various other drawbacks. Similarly, it is believed that the cost of fuels from such processes as the Fischer-Tropsch and Bergius reactions would approximate at least $0.12 per gallon (it is definitely known, however, that domestic supplies of coal would be sufficient to produce "petroleum products" by these methods for a few thousand years at the present rate of consumption). Motor benzene, while providing in normal times almost 1 per cent of our motor fuel, has no future potentialities, since its production definitely is limited by the nation's requirements of coke.

*Gulf Research & Development Co., Pittsburgh, Pa.

The amount of oil obtainable per ton of shale varies widely, some foreign plants processing shales which yield from 0.25 to 2 bbl. of oil per ton. One serious problem is waste shale disposal, since an estimated 1.5 cu. yd. of waste shale is produced per barrel of oil. Yields of gasoline are less and of poorer quality than from petroleum. Recent advances in petroleum refining technique which are directly applicable to recovery and processing of shale oil sustain the promise of competition with crude oil at a stable price of about $1.50 per barrel for crude.

The second part of this article will appear in next week's issue.

In regard to shale oil, however, it has long been known that the United States possesses "almost inexhaustible" sources of oil shale (estimated by one source as 400,000,000,000 tons)—enough, according to numerous estimates, produce shale oil in excess of 100,000,000,000 bbl. Shale oil was the victim of a premature boom in the early 1920's, when great concern was felt as to the insufficiency of our petroleum reserves. "Its value in the public mind and also in that of the oil industry fell to an unwarranted but understandable low during the discovery of the tremendous flush fields which followed, and the depression of the 1930's."[1][2]

The conclusion reached in that period was that shale-oil products might not be able to compete with petroleum products for many years—not until dwindling supplies of petroleum had forced prices to a much higher level. The discovery of new methods of refining such as catalytic cracking, reforming, polymerization, and hydrogenation, however, has weakened in many minds the "facts" behind this prediction, and to these men it does not appear unlikely that the too-heavy drain on our petroleum production facilities and reserves may cause the beginnings of a shale-oil industry to occur shortly.

In order to review such data as may be pertinent to the situation, therefore, it has been deemed of value to make this brief survey. Definite

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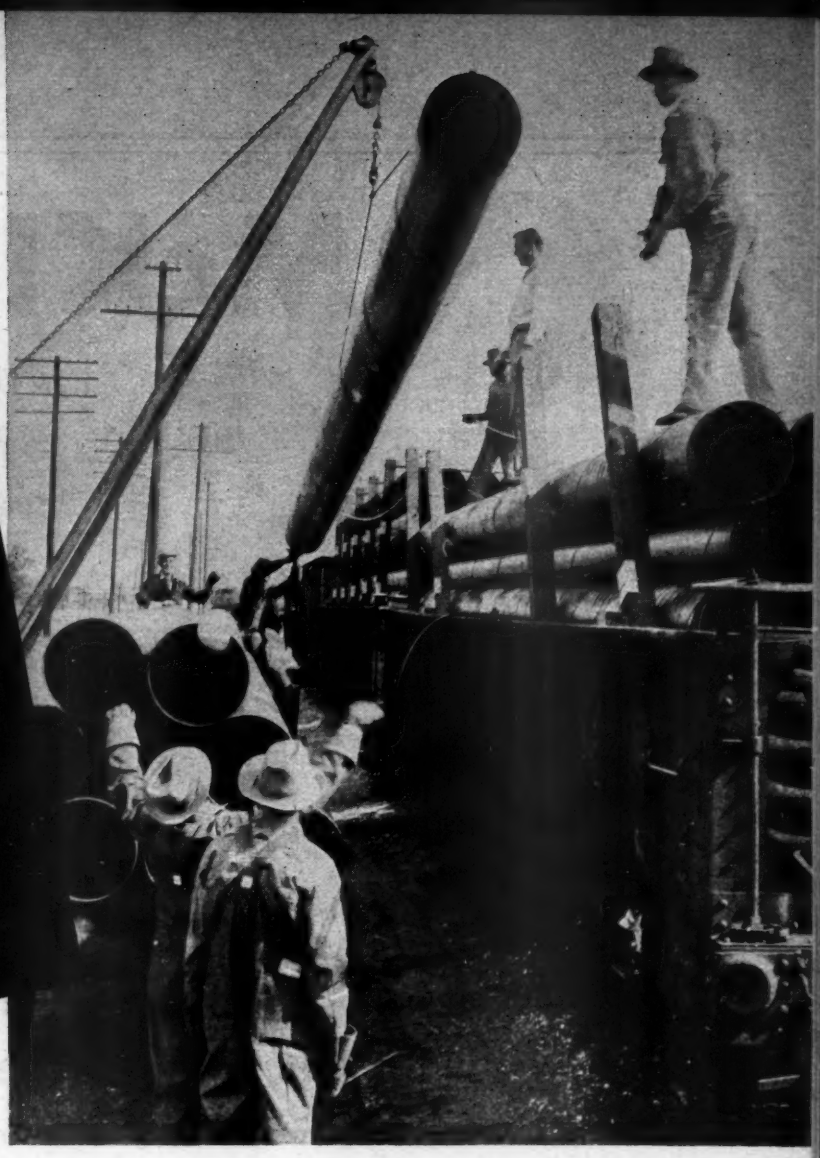

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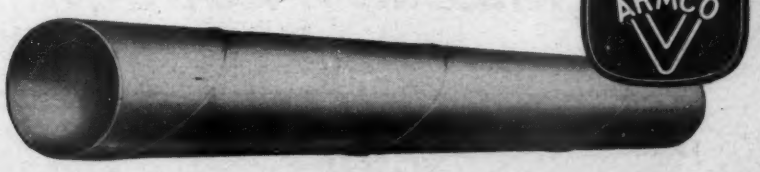

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conclusions are in many cases impossible, as a result of the masking of facts in the voluminous material available and the fact that much of these data were compiled before the art of refining had reached its present level, but the data presented are at least representative of the literature, and the accompanying bibliography may be used, if desired, to gain a much more complete picture of the situation.

Oil Shales

"Oil shale and its richer varieties—cannel coals and torbanites—are rocks which contain organic matter that on heating (or hydrogenation or extraction) yield petroleum-like oils. They are widely distributed throughout the world, and for many years they have constituted the raw materials for small but locally important industries in Scotland, France, Estonia, and Australia."[6]

An oil shale may more briefly be described as "a clay or argillaceous shale which contains kerogen." Kerogen, in turn, is the "organic matter" referred to above. "Kerogen is not a definite chemical compound but probably a complex mixture of complex compounds, and kerogens of different shales are dissimilar." The term is merely a convenient designation of the organic oil-yielding material of oil shales. "It is neither petroleum or bitumen, but a substance (a pyrobitumen) yielding petroleum and nitrogenous compounds when it is distilled."[12]

According to D. E. Winchester, the following is an estimate of the oil recoverable from oil shales in the United States:[1]

ESTIMATE OF OIL RECOVERABLE FROM OIL SHALES*

(Thousands of barrels of 42 U. S. gallons)

State—	Total oil	Recoverable oil
Tertiary oil shales:		
Colorado	79,625,998	47,625,598
Nevada	6,039	3,623
Utah	48,800,000	25,680,000
Wyoming	3,044,000	1,826,400
Total Tertiary oil shales†	125,476,037	75,335,721
Devonian black shales:		
Indiana	7,680,000	6,912,000
Kentucky	10,978,560	9,880,704
Total Devonian black shales‡	18,658,560	16,792,704
Cannel shales:		
Pennsylvania	13,800	8,280
West Virginia	13,800	8,280
Total cannel shales	27,600	16,560
Grand total	144,162,197	92,144,985

*Source: Winchester, D. E., "The Oil Possibilities of the Oil Shales of the United States," Appendix 1, Report 2 of the Federal Oil Conservation Board to the president of the United States, January, 1928, Washington, D. C. †This estimate does not include amounts of oil shale known or reported in the states of California, Montana, and Oregon. ‡No estimate is made for the states of Ohio and Tennessee, although it is recognized that undoubtedly there are areas of minable oil shale in these states.

TABLE 1—Analysis of Oil Shales From Various Localities*

Source of shale—	Ash analysis: SiO_2	Fe_2O_3 and Al_2O_3	CaO	MgO	Volatile matter and fixed carbon	Oil yield (gal. per ton)
De Beque, Colorado	44.70	25.60	17.65	5.28	40.0	42.7
Elko, Nevada	65.5	25.5	0.6	0.8	33.5	32.5
Dragon, Utah	45.8	16.4	23.9	7.9	42.2	41.6
Dragon, Utah	46.8	17.5	23.9	8.9	34.3	21.7
Green River, Wyoming	38.9	12.4	38.3	4.9	34.9	23.4
Green River, Wyoming	41.9	18.8	17.6	10.9	48.1	58.7
Kentucky	52.0	19.1	12.5	8.2	29.3	18.2
Ione, California	43.0	38.1	8.7	2.5	62.9	56.0
Casmalia, California	75.8	19.1	1.4	0.9	...	18.0

*R. H. McKee, "Shale Oil," p. 75, Chem. Cat. Co., Inc. (1925).

These estimates were made on the basis of numerous and logical assumptions, which includes such premises as: "No (Tertiary) oil shale was considered minable if it was less than 1 ft. thick, or if it would yield less than 15 gal. of oil (0.36 bbl.) to the ton or less than 3,000 bbl. of shale oil per acre of shale land"; no (Devonian black) shale was considered minable if it was less than 1 ft. thick or if it would yield less than 10 gal. of oil (0.24 bbl.) per ton of shale or less than 2,000 bbl. of oil per acre," etc.[1] Winchester himself admitted that his "recoverable oil" estimates were "ultraconservative" and that "it was not at all impossible that up to 95 per cent of the shale included in the table as Tertiary shale would be treated"[1] instead of the 60 per cent figured in the table. More recent estimators confirm the statement that a reserve of, conservatively, 100,000,000,000 bbl. of shale oil exists in the United States.

Rich oil shale is said to be very tough, to burn on ignition, and to resist erosion to a remarkable degree. Table 1 presents some analyses of oil shales from various localities. Oil shales present the fortunate case of a substance which will not appreciably diminish in supply if not immediately used, since the oil-yielding kerogens are not volatile compounds but are "partly bituminized vegetable matter in such a state of alteration that the addition of heat will produce oil."

The ash-free composition of an "average" kerogen has been stated to be as follows:[8]

COMPOSITION OF AN AVERAGE KEROGEN

	Per cent 1	Per cent 2
Carbon	69.7	73.05
Hydrogen	10.0	10.52
Oxygen	15.9	16.32
Nitrogen	3.1	....
Sulfur	1.3	....
Total	100.0	99.99

(2) On ash, nitrogen and sulfur-free basis.

At least part of the nitrogen and sulfur are in chemical combination with the other constituents of kerogen. The figures in Column 2 correspond to a formula of $(C_6H_{10}O)_x$.

Oil shales occupy an intermediate position between coal and petroleum, resembling both fuels in certain respects. "In general, as with bitumi-

Bureau of Mines oil-shale plant, near De Beque, Colo.

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WELDING IS THE TOWER IN POST-WAR DESIGNS

nous coal, the water content of oil shales does not exceed 20 per cent, whereas, up to 60 per cent moisture may be present in brown coals. The ash content of shales varies between 20 and 75 per cent or more, while in the case of bituminous coal it varies between 4 and 12 per cent, and in the case of brown coal between 5 and 15 per cent."[1] The ash content of bituminous coal can be reduced by mechanical means, that of brown coal by chemical means, but both mechanical and chemical methods have little hope of success in the case of shale.

"The C : H ratio in the organic matter in shale—about 11-14 H : 100 C—corresponds more closely to that of petroleum oils with about 12-14 H : 100 C than to that of coal, since brown coal, for example, contains 7-9 H : 100 C. Moreover, in some shale deposits, the organic material contains as much oxygen as coal. Oil shales resemble bituminous coal in that the organic material cannot be extracted in normal circumstances with ordinary organic solvents, while from brown coal a portion of the organic matter, especially bitumen and resinous material, may be extracted at atmospheric pressure. As in the case of coal, by extraction at high temperature and pressure, a large portion of the organic material in the oil shale can be brought into solution with slight polymerization. Both coal and shale when subjected to heat treatment yield low-temperature carbonization products by decomposition of the organic material. Based on the organic matter, the yields obtained from shale are higher than from coal, so that shale in this respect takes an intermediate position between coal and petroleum oil."[1]

Since oil yields of only about 5-6 per cent by weight are obtained from shale with a low organic content (yields of up to 45 per cent are obtained from certain Australian shale), "the production of shale oil is thus comparable in many respects with many of the low-grade ore-mining industries of the world in that a large weight and volume of raw material must be mined to obtain a relatively small percentage of a concentrate for final refining into useful articles of commerce."[6]

Waste-Disposal Problem

The waste disposal may well become a serious problem if the industry assumes large proportions, since by one estimate, involving a shale capable of yielding 35 U. S. gal. of crude oil per ton of shale, there will be produced 1.5 cu. yd. of waste per barrel of oil produced. Thus, "to produce 1,000,000 bbl. of shale oil per day, 1,200,000 tons, or roughly 1,000,000 cu. yd. of solid shale would have to be mined, transported, crushed, and handled through retorts every 24 hours and approximately 1,500,000 cu. yd. of broken waste spent shale disposed of."[6]

There is considerable controversy as to the attendant costs of mining oil shale. A recent survey by "a reputable mining engineer" indicates a cost slightly under $0.40 per ton of material mined for open-quarry operations, laid down crushed at the point of delivery, including operating overhead. "Block-caving systems, also used by low-grade copper producers, will add from $0.20 to $0.30 per barrel of producible oil to the above figure, depending upon the details of the particular operation. Obviously the more favorable quarry operations will be used first."[7] Somewhat higher costs, comparable to those for shaft coal mining, would be required for those operations where shafts would have to be sunk. The above estimates are based on shales containing on the average ½ bbl. or less of oil per ton mined. Another recent survey[7] indicates comparable figures.

The Production of Shale Oils

The commercial processes long in use abroad for the production of oils from oil shale have all involved low-temperature carbonization in retorts of various types. The properties of the products obtained and the yields are dependent both on the carbonization process and on the nature of the shale.

It is said that:

"1. The quality of the oil produced from a given shale is largely a characteristic of the particular shale.

"2. The yield of oil from a given shale increases with the rate at which the oil is produced up to a certain maximum. If rates higher than those which give maximum quantities are attempted, overheating will decompose the oil, decreasing the oil yield and increasing the yield of gas.

"3. The quality of oil produced from a given shale, as indicated by relatively low specific gravity, relatively high volatility, and relatively low percentage of unsaturates, improves as the rate of oil production decreases."[8]

The production of oil from kerogen takes place in two stages. A primary decomposition yields intermediate bitumens, which decompose to yield shale oil. "Shale oils are really mixtures, in varying proportions, of (a) primary decomposition products of the organic matter of shale, and (b) oils resulting from the cracking or further decomposition of the primary product."[6] This being the case, shale oils improve in quality on redistillation.

Numerous retorts of various types have been devised for carbonization of shale. These differ in value for different shales and their comparative merits are not defined clearly. The Bureau of Mines conducted pilot plant experiments during the 1920's with two types of retorts, the Pumpherston vertical retort (a Scottish development), and the "Dundas-Howes" or "N-T-U" retort, which differs from the Pumpherston in that it is internally heated (direct heating) and may be of either intermittent or continuous nature (the Pumpherston is a continuous-type retort). Results obtained from these experiments indicated that good yields could be obtained from either type, although the Pumpherston retort cannot be used for coking shale. Tables 2 and 3 compare the charges, yields, and oil retorted from the same shale in the two retorts.

In regard to temperatures of carbonization, in the rapid retorting of a typical Colorado-Utah shale the first oil vapors appeared at 365° C. (689° F.) and the last oil was off at 525° C. (977° F.). In slow retorting, the temperatures at the start and at the end of the production were 360° C. (680° F.) and 460° C. (860° F.), respectively. Another source reports

TABLE 2
Comparison of Charges and Yields From the Same Shale in Pumpherston and N-T-U Retorts§

	Pumpherston retort*	N-T-U retort†
Shale charged, short tons	25.2	28.9
Assay value of charge, gal. per ton	35.5	36.0
Steam added, gal. of water	1,670	...
Steam added, gal. of water per ton of shale	66	...
Oil yield, total gal.	800	1,008
Oil yield, gal. per ton of shale	31.8	34.8
Oil yield, per cent of assay	89.3	96.7
NH_3 yield, lb., total	48	...
NH_3 yield, lb. per ton of shale	1.9	...
NH_3 yield, lb. per gal. of water	0.03	...
Gas yield, cu. ft., total‡	100,000	...
Gas yield, cu. ft. per ton of shale‡	4,340	...
B.t.u. per cu. ft.	300	nil

*The figures in this column represent four times the average daily operation during the 3-week test period in one retort at the Bureau of Mines experimental oil-shale plant.

†The figures in this column represent a single run of the N-T-U retort.

‡A portion of this quantity of gas was used in heating the retort. It supplied all of the heat applied to the retort, except the steam.

§"Oil Shale and Cannel Coal," p. 243, The Institute of Petroleum (London), 1938.

TABLE 3
Comparison of Oil Retorted From the Same Shale in Pumpherston and N-T-U Retorts*

	Pumpherston retort	N-T-U retort
Specific gravity	0.887	0.911
Sulfur (S), %	0.67	0.71
Nitrogen (N), %	1.91	2.20
Pour point, °F.	80	90
Distillation of the oil:		
Distillate to 200° C., %	15.4	6.8
Distillate to 200° C., sp. gr.	0.796	0.823
Distillate 200°-275° C., %	19.7	16.8
Distillate 200°-275° C., sp. gr.	0.854	0.861
Distillate to 275° C., %	35.1	23.6
Distillate to 275° C., sp. gr.	0.829	0.850
Residuum, %	64.9	76.5
Residuum, sp. gr.	0.917	0.930

*"Oil Shale and Canal Coal," p. 244, The Institute of Petroleum (London), 1938.

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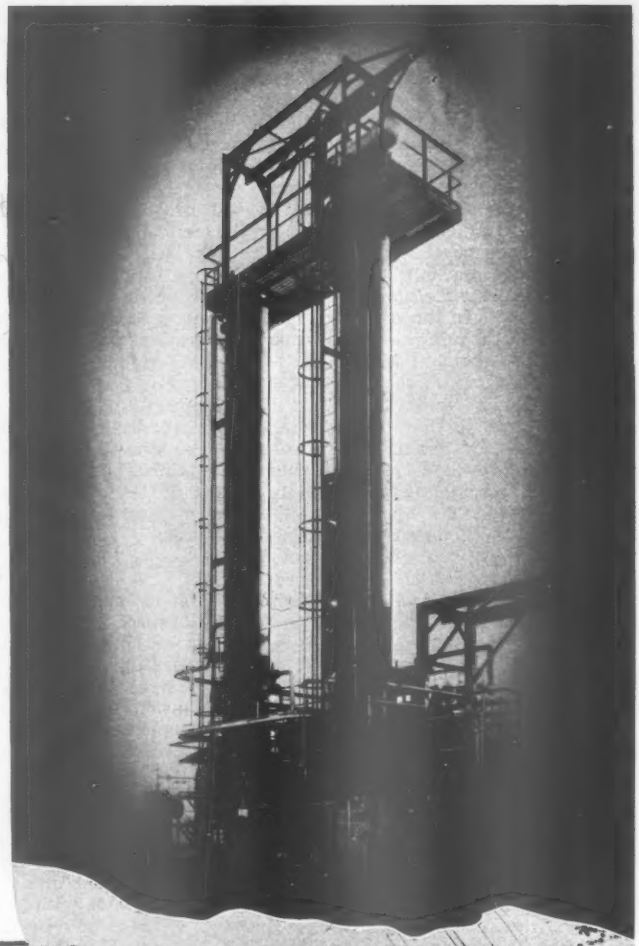

GIRBOTOL PROCESS APPLICATIONS IN REFINERY AND NATURAL GAS FIELDS

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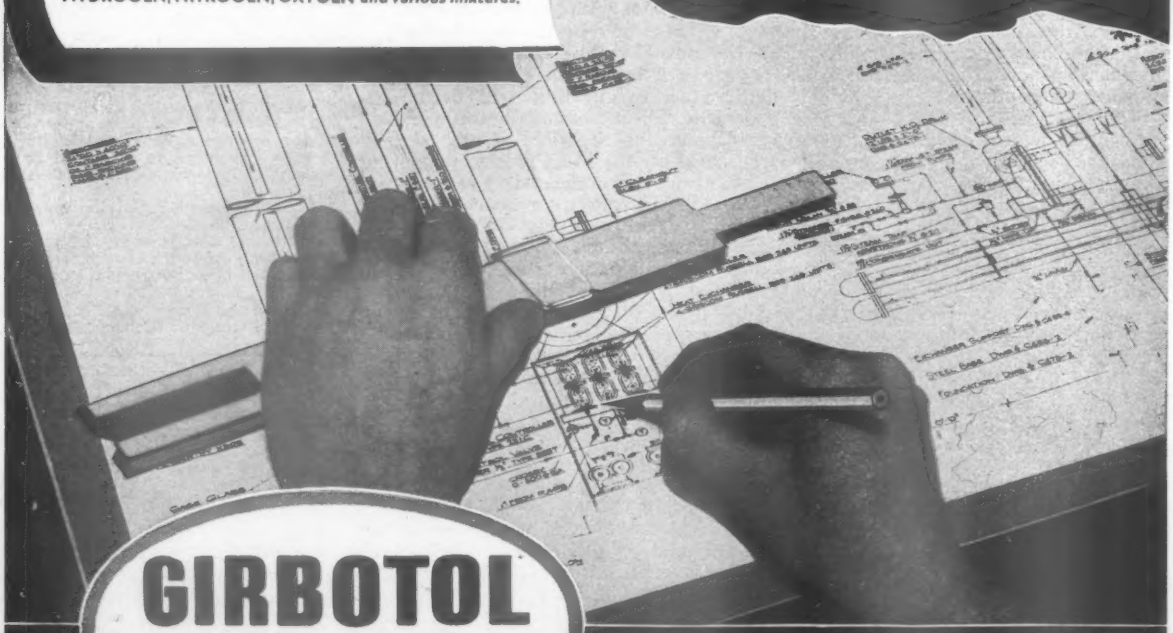

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that retorting temperatures in general range from 500° F. to 700° F.

Recently, other methods for continuous recovery of shale oils have been proposed, such as passing suspensions of finely powdered shale in inert suspension gases through a reactor at 800°-1,100° F., removing the gaseous mixture of suspension gases and distilled oils from the spent shale, and separating the distilled oils from the suspension gases without substantially cooling the mixture.[34] Further development of such methods and continuous refining processes are well within the scope of modern petroleum technology; the method just discussed, for example, bears analogy to the fluid catalyst process.

It should be noted that shale oils obtained by carbonization differ greatly among themselves in chemical composition and properties. The paraffinic type shale oils (such as those of Scotland) closely resemble mixed-base petroleum oils (see Table 4). Asphaltic shale oils, however, do not compare closely with asphalt-base petroleum oils but resemble more closely in their properties certain coal tars (see Table 5).

Table 6 presents a comparison of oils produced from various oil shales. Table 7 lists distillation data on a few miscellaneous shale oils.

As may be seen from the aforementioned tables, shale oils contain varying amounts of nitrogen compounds such as pyridines, also phenols, cresols, and sulfur compounds. The extraction of certain of these may provide valuable byproducts. The subject of sulfur compounds will be discussed later. In Scotland, the carbonization process yields ammonia as a valuable byproduct (in the gases), but not all American shales would be capable of yielding commercial amounts.

TABLE 4
Paraffinic Shale Oil and Mixed-Base Petroleum Oil*

	Paraffinic shale oil	Mixed-base pet. oil
Total oil:		
Sp. gr. at 15° C.	0.882	0.906
Asphalt, %	0.35	0.31
Paraffin wax, %	9.3	3.7
Middle oil,† 180°-325° C.:		
% of total oil	42.2	23.8
Sp. gr. at 15° C.	0.840	0.840
Residue above 325° C.:		
% of total oil	53.6	71
Sp. gr. at 50° C.	0.895	0.913
Residue above 325° C. at 12 mm., %	20.2	41.8
Ultimate analysis of total oil:		
C, %	85.81	86.08
H, %	12.29	12.26
O, %	0.26	0.87
N, %	1.32	0.25
S, %	0.32	0.60
H : 100 C	14.3	14.2
H disp.	13.9	13.96

*"Oil Shale and Cannel Coal," p. 397, The Institute of Petroleum (London), 1938.

†The small quantities of gasoline contained in the oils were omitted as unimportant here.

TABLE 5—Asphaltic Shale Oil, Brown-Coal Tars, and Asphalt-Base Petroleum Oils*

	Asphaltic shale oil (Estonian)	Tar from brown coal rich in bitumen	Tar from brown coal rich in oxygen	Asphalt-base petroleum oil
Total oil:				
Sp. gr. at 15° C.	1.006	0.951	1.033	0.910
Asphalt, %	6.7	1.2	8.2	2.1
Paraffin, %	0.01	11	9.5	0
Middle oil, 180°-325° C.:†				
Total oil, %	28.6	40.1	28.6	24.2
Phenols, %	19	21.8	24.4	0.28
Middle oil, dephenolated:				
Sp. gr. at 15° C.	0.883	0.908	0.930	0.856
Residue above 325° C.:				
Total oil, %	69.0	59.8	71.4	73.9
Sp. gr. at 50° C.	1.031	0.948	1.025	0.980
Residue above 325° C. at 12 mm., %	34	11.8	35 approx.	70
Ultimate analysis of total oil:				
C, %	82.45	83.42	82.60	84.72
H, %	9.62	10.55	9.24	11.71
O, %	6.00	4.09	7.64	1.88
N, %	1.07	0.17	0.29	0.21
S, %	0.86	1.75	0.23	1.48
H : 100 C	11.68	12.67	11.19	13.83
H disp.	10.43	11.80	9.92	13.39

*"Oil Shale and Cannel Coal," p. 398, The Institute of Petroleum (London), 1938. †The small quantities of gasoline contained in the oils were omitted as unimportant here.

TABLE 6—Comparison of Oils Produced From Different Oil Shales*

Source of shale—	Oil yield U.S. gal. per 2,000 lb.	Specific gravity of oil	Per cent of crude distilled to 275° C.	Unsaturates in distillates to 275° C.†	Setting point of crude oil‡
Soldiers Summit, Utah	49.7	0.894	37.2	36.9	28.5
Grand Valley, Colorado	36.7	0.899	38.5	42.8	25.0
De Beque, Colorado	45.3	0.897	34.8	39.8	27.5
Elko, Nevada	63.2	0.866	36.7	33.3	35.0
Kentucky	16.0	0.934	40.9	44.2	0
Brazil	118.7	0.870	40.5	33.6	19.0
Australia	121.8	0.867	40.2	26.9	18.5
Scotland	17.7	0.872	37.6	23.8	33.0
Utah, Coal	33.6	1.002	38.0	47.8	32.0

*"The Science of Petroleum," Volume 4, p. 3,086. Oxford University Press (London), 1938. †Percentage soluble in excess of 98 per cent sulfuric acid under definitely specified conditions. ‡An arbitrary method of determining the melting point of the oil.

While the only commercial method of producing oil from oil shales has been by carbonization, other methods in recent years have received increasing attention. Since the oil is not present in the shale as a separate substance, "no success has been obtained in the deashing of shale by the methods used for coal—for example, application of the swim-sink process or acid treatment."[1]

Up to a few years ago, similarly, it was believed that it would never be commercially practical to separate the ash from the organic matter by extraction with organic solvents, since extraction at atmospheric pressure results in only a slight degree of solvation. "It is easy, however, to extract more oil from shale by the application of pressure, high temperature and suitable solvents than can be obtained by carbonization."[1] For example, an Estonian shale which on carbonization gave a 53 per cent yield of oil (based on the organic matter) yielded 67 per cent of extract when treated with a bituminous coal-tar oil at 80 atmospheres pressure and at the relatively low temperature of 410° C.

Solvents proposed for such extraction include fuel oils, anthracene oil, and primary tars. In solvation, the original high-molecular structure of the organic matter in the shale is only slightly broken down, so that the extract consists frequently of a high-boiling product containing 25 per cent asphalt. "To convert this ash-free ex-

(Continued on Page 72)

TABLE 7—Miscellaneous Shale-Oil Distillation Data*

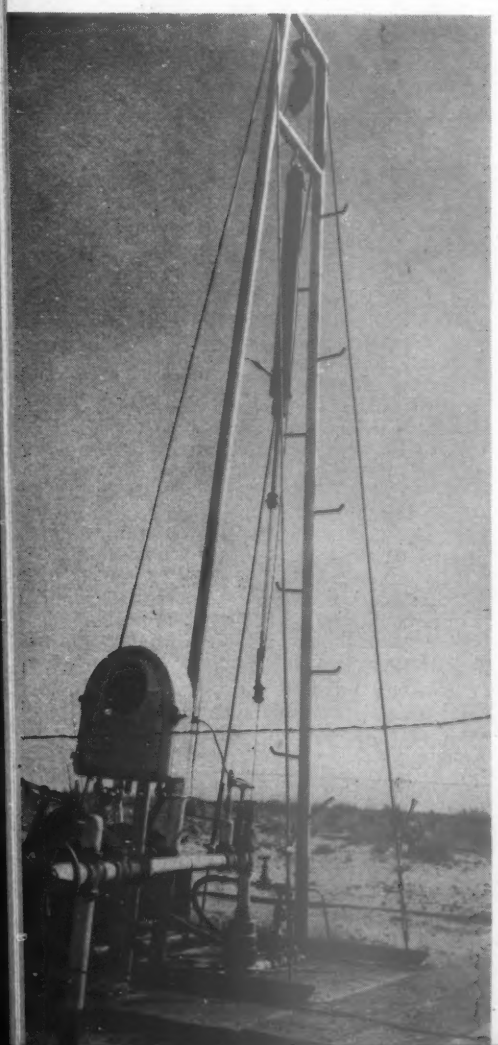
Sample Colorado shale-oil fractions:	Per cent
Gasoline	6-12
Kerosene	28.5-49
Paraffin	1.63-7.70
Asphalt	0.47-3.62
Sample Indiana shale oil:	
Distillation of the oil:	Per cent
Distillate to 150° C.	17.75
150°-200° C.	11.75
200°-250° C.	17.75
250°-300° C.	16.00
Above 300° C.	8.50
Coke and tar	28.25
	100.00
Miscellaneous properties:	
Percentage of:	
Unsaturates	55
Pyridines or pyridine compounds	2 to 5
Phenol	0 to 0.5
Cresols	1 to 2
Sulfur compounds	2 to 3
Specific gravity (average)	0.8900
Heat of combustion, B.t.u.	19,200

*Adapted from reports of J. R. Reeves and D. E. Winchester.

Wells in West Texas Pool Carried To Depletion by Gas Lift

by Harry F. Simons

Availability of high-pressure gas and a producing formation which sloughs and which contains considerable fine sand are factors which led to the widespread use of gas lift to produce wells in the South Ward field. In some cases pumping equipment has been removed.



Equipment of one type used in the South Ward field. Timing device in metal box actuates piston which lowers steel line and sinker bar so intermitting valve near bottom of casing opens. Returning fluid trips mechanism which causes piston, line and sinker bar to raise, thus shutting off gas injection

THE South Ward field in Ward County, Texas, is one of the pools showing a new trend in production practices and particularly the application of gas lift to rather shallow wells having a low productivity. The production in the field is not all obtained by gas lift but this method is so widely applied there as to attract attention. In some cases, pumping equipment has been removed from wells and gas-lift installed.

Several conditions are present in the South Ward pool which provide the incentive for the wide use of gas lift as a means of production. The first is the availability of high-pressure gas from two gasoline plants processing the sweet gas produced with the oil, and the second is producing formation which sloughs and which contains considerable fine sand. The first permits the use of gas lift as a production method; the second causes high maintenance expense on the pumping wells.

The producing formation is the Yates sand at an average depth of 2,500 ft. with approximately 40 ft. of pay scattered over 300 to 400 ft. The pay is generally topped around 2,160 ft. and casing is set to around 2,200 ft. In some cases this hole is protected by liner and in others the hole is left open. Putting liners in the wells prevents sloughing but the liners become clogged and shut off the oil. It is practically a tossup with those employing liners favoring such completions and those without preferring open hole.

Wells in the field are completed flowing with an oil-gas ratio of about 1 : 1,000 (R. R. Com. order is 1 : 2,000 and all are able to stay under it). The wells flow for 2 to 4 years before artificial lift must be installed. As the field was discovered in 1929, all but recent completions are lifted by pumps on gas lift with the average well making about 5 bbl. per day. There are approximately 580 wells in the pool.

Economic limit of wells in the field, due to the production difficulties, is about 5 bbl. per day. However, some wells have been profitably produced on gas lift and pump when making as little as 2 bbl. per day. These wells are the ones which give no trouble, only occasional pulling jobs, and practically no maintenance or repair work is required. Pumps in such wells are set high to get away from sand troubles and this factor contributes to their low productivity.

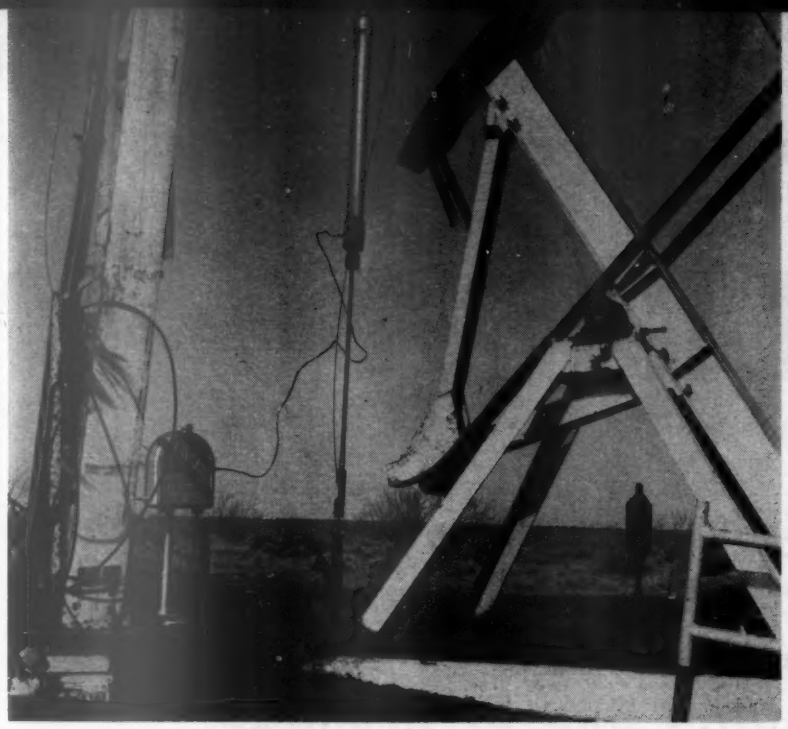
Sand produced with the oil is extremely fine and sharp and collects in the separators, heaters and gun barrels. Sand passing through a pump cuts the barrels, plungers and cups badly and for that reason it is impossible to run the pump on or near bottom. If the pump is near bottom there is danger of its sanding up if the well is shut down. Consequently, when the fluid level recedes to a low point, it is impossible to get the maximum production from the well with a pump without boosting substantially the number of well-pulling jobs.

In recent months one company has successfully reduced the number of pulling jobs by keeping the formation covered with fluid. This prevents sloughing and also allows the sand to settle from the oil before it passes through the pump. A flood nipple prevents the wells from being pumped off. Some special pumps have also given good service.

The amount of sloughing in the hole depends to a certain extent on the water associated with the oil. Where considerable water is being handled, the hole is apt to cave badly. In one case, for instance, tubing was pulled in such a well and 60 ft. of hole lost, i.e., there was that much lacking when an attempt was made to get back to bottom. If the hole caves while a pump is near bottom, the rods and tubing must be pulled and the well cleaned out.

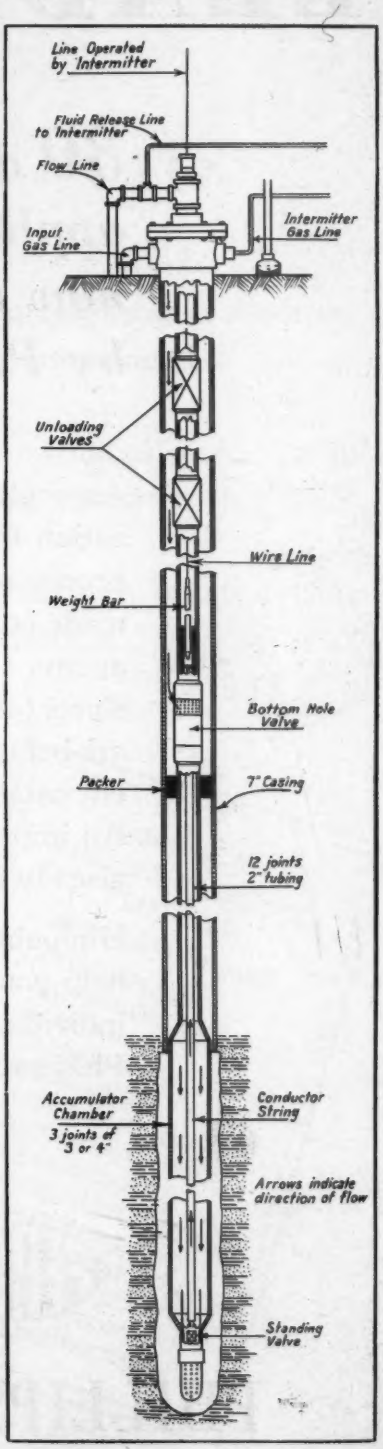
Two Types of Systems

Either time or volume control gas-lift systems are used in the field. The produced oil containing the sand



Left: Gas-lift installation which replaced rod-pumping equipment in a well in the South Ward field. Jack was operated through pull line from central power

Below: Schematic drawing of gas-lift installation used in producing low-volume wells in South Ward field, Ward County, Texas



(and sometimes shale) does not pass through the operating mechanism, consequently there is no wear from this cause. The gas-lift systems will also handle considerable quantities of shale, and in some cases where the wells have been pulled, slugs of shale and muck are lifted while putting them back on production. In such cases the flow line is broken and this debris flows into a small pit.

One operator with 17 wells on gas lift produces approximately 200 bbl. per day at an average gas-oil ratio of 2,000 to 1. This is an average of approximately 12 bbl. per well with the smallest well making 5 bbl. per day and the largest making 40 bbl. per day. The wells are all operated by one man. In three years these 17 wells have been on gas lift there have been 12 pulling jobs and only three of these were to repair the gas-lift equipment. One well was installed in May of 1940 and hasn't been pulled since then. The wire line controlling the intermitting system broke in several cases but most of the pulling jobs were to clean out the wells in the hopes of increasing production.

The pressure on the main line supplying gas to the field is approximately 400 lb. and the equipment is operated at 300 to 320 lb. Some of the wells can operate sufficiently at as low as 250-lb. pressure and others as low as 200 lb.

Wells are operated on a 24-hour basis, the intermitting mechanisms being set to inject gas whenever there is an accumulation of oil in the hole. The well making 5 bbl. goes through the injection and lifting cycle once each 2 hours while the one making 40 bbl. per day goes through its lifting cycle 36 times a day (24 hours). The larger the quantity of oil produced with each lifting cycle, the lower the gas-oil ratio. All of the gas-lift wells are operated with the standing valve as low as possible to obtain the maximum submergence.

Compression charge for gas used to operate the gas-lift wells delivered by one company in the field is on a sliding scale and is as follows:

Quantity of gas used—	Cost per 1,000 cu. ft.
First 100,000	$0.05
Second 100,000	0.04
Third 100,000	0.03
Fourth 100,000	0.03
Fifth 100,000	0.03
All over 500,000	0.02

This gas is gathered from the leases, taken to the plant, compressed and stripped of its fluid and the gas returned at 400-lb. pressure to the leases. The billing is on each day's use and not on the average. Thus the compression charge for the 17 wells using 400,000 cu. ft. per day amounts to approximately $14 a day.

Another operator in the field employing gas lift uses 1¼-in. tubing which was originally installed inside 7-in. casing and a 5-in. liner to prolong the flowing life of the wells. When it became necessary to install artificial lift the tubing would have required replacement if pumping systems were to be installed. Instead wire-line-type gas lifts were used.

This operator's 68 wells average 7 bbl. per day with a gas-oil ratio of 3,000 : 1 in which is included the gas used in blowing the lines, etc. The wells are maintained by one well-pulling crew and one operating crew. Most of the pulling work is occasioned by the gas used which causes a scaling condition on the tubing and casing. This scale gets in the valves of

(Continued on Page 60)

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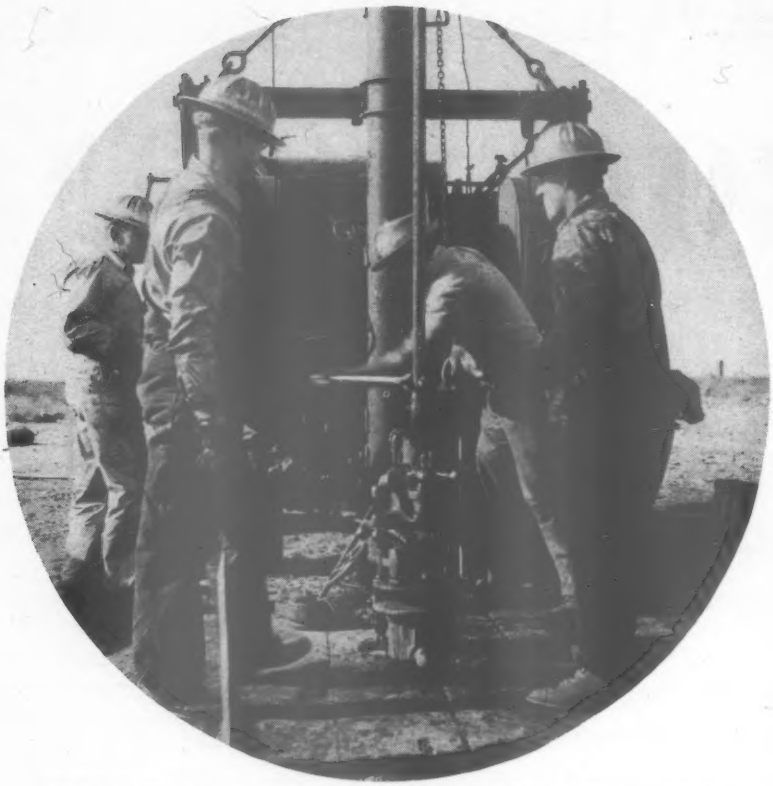


Pulling 1¼-in. tubing on a gas-lift well in the South Ward pool. Scale on tubing is being scraped off and casing also will be scraped. Scale is caused by condition of gas, remedy for which is being designed. All the wells do not have this trouble but scaling accounts for 50 per cent of the repair work required by wells

the intermitting system and causes approximately 50 per cent of the pulling jobs. Some of the wells have gone over 2 years without pulling. Plans are now being made to dehydrate the gas and otherwise purify it to prevent the scaling.

Economic limit under this particular company's methods is considered to be 3 bbl. per day. However, each well is judged on its own merits, one making no water and requiring pulling at long intervals having a lower economic limit.

Another company using gas lift in the field does not purchase its gas from the gasoline plants but has its own compression facilities consisting of a two-stage, engine-driven compressor, scrubbers, etc. The gas is practically recycled with the excess being sold to the gasoline plants. No figures are available on the compression costs. This company also uses surface controlled wire-line gas lifts.

Operation of Systems

Both volume-control and time-control intermitting gas-lift systems are used in the field. Both are set to go through an injection cycle at certain intervals. The former starts injecting the gas and continues injecting until the fluid begins arriving back at the surface at which time the gas injection is shut off. The latter opens at the predetermined interval and remains open a set length of time, after which it closes. The valves in the well through which gas is admitted are operated by a sinker bar on a steel line.

Practice in the field is to run the standing valve as near bottom as possible and just above it 2 or 3 joints of 3-in. or 4-in. pipe for an accumulator chamber. (Diameter of accumulator chamber is dependent on whether the well is equipped with liner or not.) Approximately 12 joints 2-in. tubing are run on top of the accumulator chamber and below the intermitting valve. This places the intermitting valve about 450 ft. off bottom with the packer between casing and tubing just below it. The packer prevents any pressure being applied to the formation.

Wells are equipped with one or two unloading valves above the intermitting valve for starting the operation. These are actuated by the sinker bar which holds the valves open while the bar is in the collar which houses the unloading valve. On the most widely used systems in the field it is also possible to crack the intermitting valve by lowering the sinker bar so the gas is discharged upward into the tubing which makes the intermitting valve act as an unloading valve.

The input gas is admitted into the casing in which the set pressure is continuously maintained. When the time arrives for an injection cycle, the wire line is raised which elevates the sinker bar and opens the flow valve, opening it and allow gas to flow into the accumulator chamber. The eductor tube below the intermitting valve and inside the accumulator extends to just above the standing valve and as gas is admitted to the accumulator chamber, oil is forced up through the eductor tube, through the bypasses in the intermitting valve, into the tubing above and thence to the surface. This is shown diagrammatically in an accompany illustration.

The installations at South Ward are the direct antithesis of the original conception of gas lift which was the production of large quantities of fluid from wells just after the flowing stage. At South Ward it is for producing wells which are in, or approaching, the stripper stage. While gas lift has not eliminated pumping in the field it has in several instances replaced pumping equipment and those using it contend it is the most economical method of obtaining the production in that area.

Boiler-Water Treatment

(Continued from Page 47)

free hydroxyl ion precipitates the copper ion as insoluble copper hydroxide.

Sodium pentachlorphenate is a relatively new organic chemical. It has been found particularly toxic to algae and slime-forming organisms in industrial cooling-water systems. In addition to high degree of toxicity to algae, fungi, bacteria and protozoa, it is highly stable in alkaline waters is stable on aeration and is not volatilized.

While the problems encountered in cooling-water systems fall into the three general classes of scale formation, corrosion and biological fouling, they vary widely in their complexity and method of solution. There is an ample amount of technical knowledge and experience available to cope with almost any cooling-water problem. A complete study of the individual problems by a competent water engineer will permit formulation of recommendations.

The recommendations should include not only the type or types of treatment to use but also what tests should be made by the plant to control the additions of treatment and cycles of concentration within the optimum range. Close cooperation between the plant engineer and the supervising water engineer is necessary and will lead to the proper and economical solution of the problem.

Effective Pipe-Line Terminal Methods

by Paul Reed

This article concludes a consideration of practices employed by a major pipe-line company for improving the manner in which various operations are conducted. Following a discussion of pipe-line repair and recording of data, in the issue of April 8, certain methods observed at a pipe-line terminal tank farm are dealt with here.

SEVERAL methods have been devised for solving problems faced in the operation of storage facilities of a large terminal of Humble Pipe Line Co. Experience has shown these to be effective.

On the side of certain large tanks at the tank farm of the main terminal, there is a space painted white to furnish a background on which the figures are painted in black which aid in indicating the location of ends of swing pipes. The actual height of a swing pipe is indicated by a marker fastened to a line passing from the inside of the tank to the ground. By looking at the figure opposite this marker, it is possible to tell the height of the swing pipe.

Methods for Installing Neoprene Hose on Floating Roof Tank

A policy of the company specifies that men are not to enter floating roof tanks except under unusual circumstances such as when it is necessary to work on a swing line. Tanks are cleaned out by steaming and floating the oil out with water. Seventy-two hours are required for steaming a tank to rid it of gas from sour crude.

In order to install a neoprene hose for draining the sump of a floating roof tank the operation is conducted in the following manner: An 8-in. flange is put on the side of the tank; in the flange there is a 3-in. nipple, connected to one end of the neoprene hose. One end of a rope is tied to the end of the hose. The other end of the rope is fastened to a piece of small diameter pipe. By pushing the rope toward an opening near the sump, the rope can be reached by a man outside who can pull up the neoprene hose so that it can be clamped to a short piece of hose, fastened to the check valve in the sump. The legs of the floating roof tank have rounded noses on the bottom which push the hose to one side if, by chance, they come in contact with it.

For stopping leaks in large tanks of a terminal tank farm, sheep manure is used. This is injected into the top of the tank through a hopper placed over a manhole. An air compressor, connected with the hopper equipment, blows the manure into the tank. The hose to the air compressor and the hopper is grounded to the shell of the tank by copper wire to eliminate fire hazard. For actually closing the leak, only a bucketful of manure may be necessary but in order to insure that the manure reaches the place where it is needed, 50 to 100 sacks may have to be put into the tank. Stopping leaks by this method was originally adopted as a temporary means. However, leaks which were stopped by this method 4 years ago have not given any trouble in the meantime.

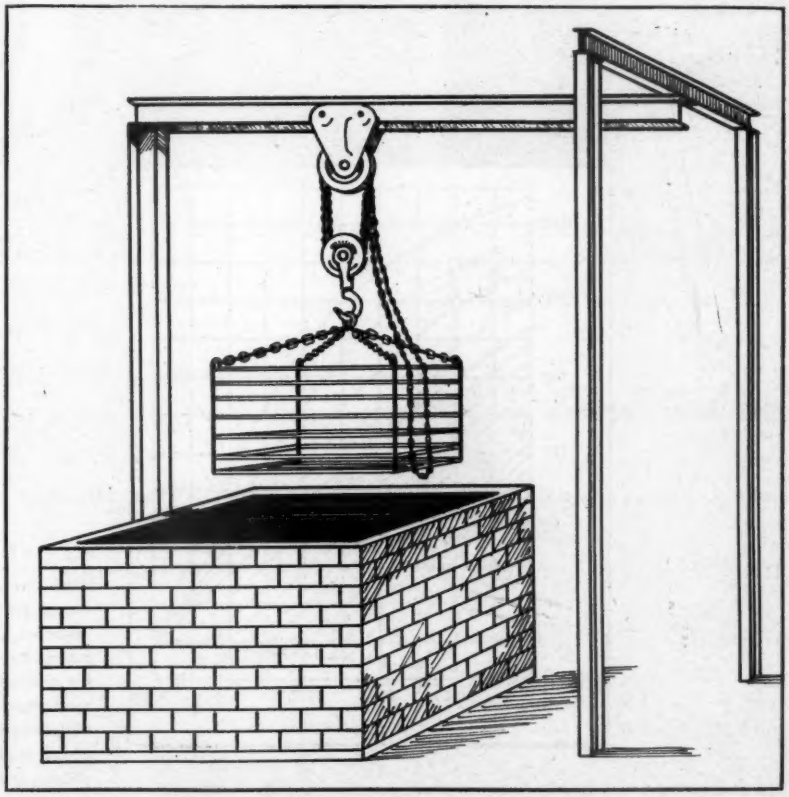
On the grounds of the tank farm of the terminal more than 250 sheep are grazed.

Valves and Tanks

Valves on lines of the terminal grounds are painted different colors to indicate their functions. Green is for a No. 2 system, red is for the big Satsuma system; half green and half white means a line dropping oil into a yard line. In other places, blue and yellow are used for painting valves.

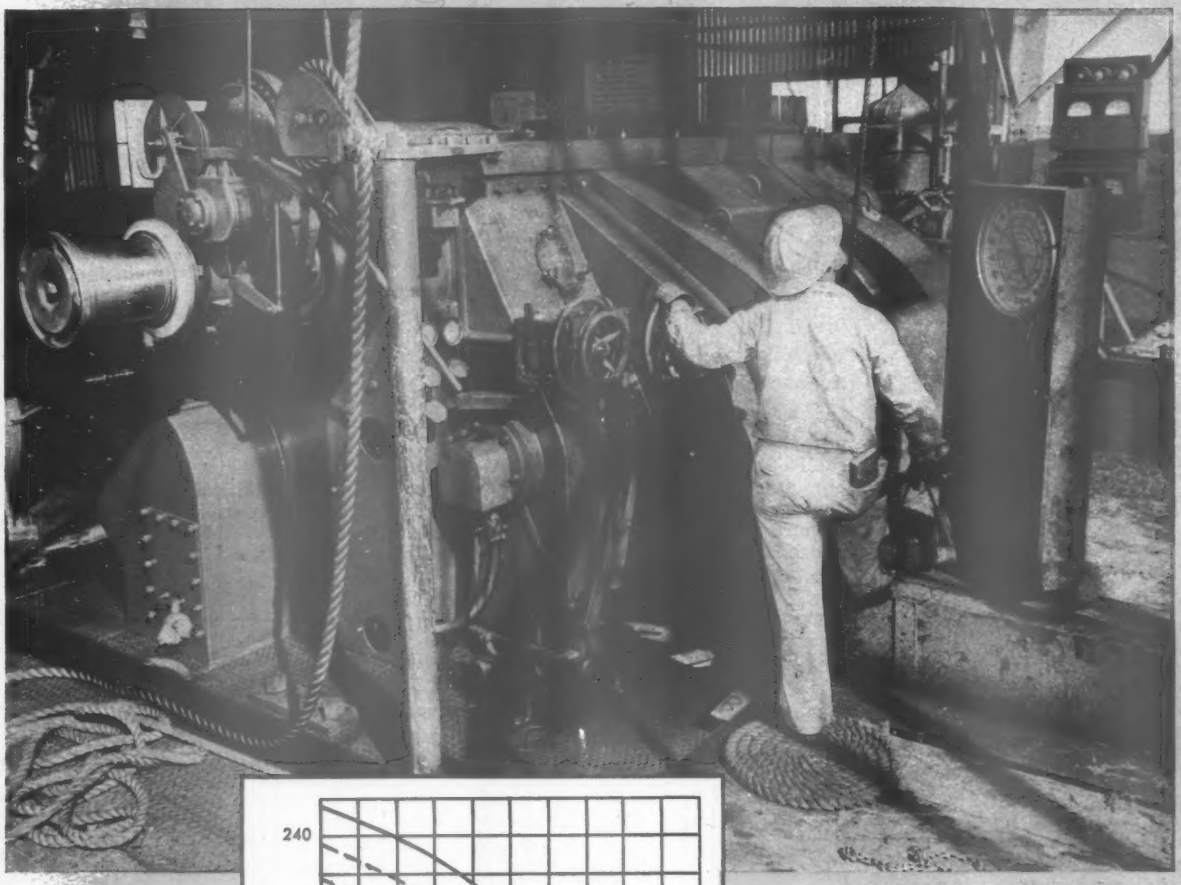
Tanks used for supplying the station are a water tank, a main fuel tank and an auxiliary fuel tank used when men are cleaning the main fuel tank. On the main water tank there is a 3-in. air line connecting a whistle with a float. When the water level drops 1 foot, the whistle blows to notify the engineer on duty. This happens often and the whistle has been found worth while.

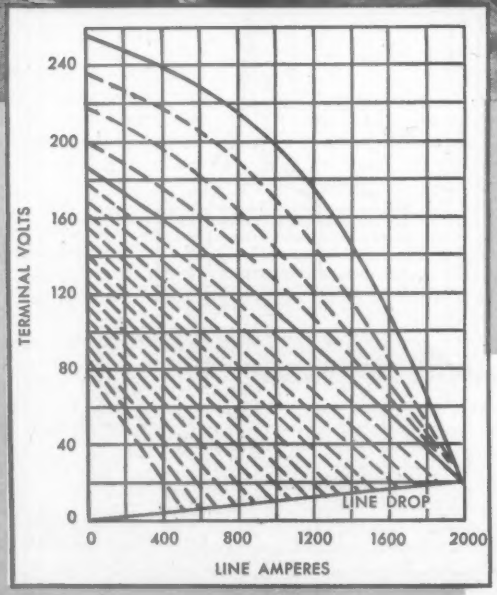
Because of the simplicity of many of these devices, it is easy to lose sight of their significance in safeguarding the company's investment in crude oil in transit from oil fields in all parts of Texas to refineries on the Gulf Coast.



Equipment for dipping fittings in hot chemical bath for removal of products of corrosion

FOR *Mobility* AND *Control*





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There are twenty points of speed and stall torque for generating equipment in Westinghouse d-c variable-voltage rigs. This means any speed is available as required for fishing, coring, table drive, hoisting, mud pumping or mixing. In addition, any value of starting torque up to 200 per cent of full load torque is available for gradual pickup or smooth acceleration of any load.

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First: Mobility . . . plus compactness and quick setup. Small, lightweight skid-mounted electric units are easy to handle as opposed to heavy, cumbersome steam equipment. These rigs can be used in any locality without fuel and water restrictions which limit applications of steam rigs. Mounted on trailers, barges, or in the conventional manner, Westinghouse Electric Rigs meet with approval on all kinds of assignments . . . on land or water . . . in shallow, medium or deep drilling.

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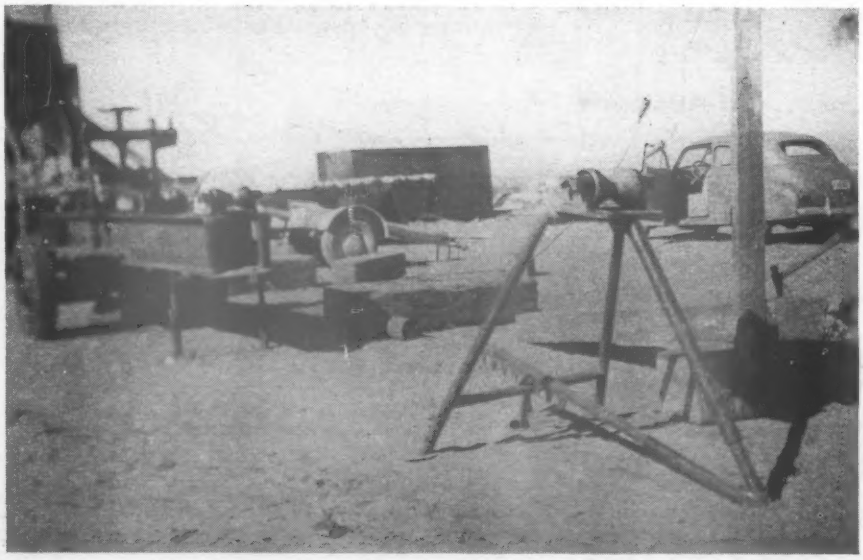
OPERATING IDEAS

Draw-Works-Housing Guard

TO forestall injury to the derrick line by running against the draw-works cover, a block of oak or other tough wood frequently is used as buffer or guard. This block is notched by one driller to leave recesses into which the upper and lower cover plates fit, the stop being inserted from the side and driven into place. The lower end is held by a notch cut into the cover plate, the upper end being pinned in place with a spike driven through the end of the block, the nail passing through a hole in the cover to take the nail. The cover plates thus retain the wooden block firmly, and prevent the stop from jarring loose during a run and possibly damaging the line. The use of the stop insures proper turning of the line at the end of one wrap on the drum and the beginning of the next.

Swinging-Light Support for Mud Pump

A FIXED light over a mud pump is little better than a bulb at the end of an extension cord. Neither gives the light where needed and at the same time it is exposed to breakage. By mounting a long arm on the head of the discharge fitting, and carrying the light fixture on a spring-mounted bracket at the end, light may be spotted at any point on the 360° circle of the fixture as the arm is revolved. To avoid trailing wires, the lighting current is brought into the arm at the pivot point, thus allowing the arm to be revolved without tangling with or straining the circuit. The cable is insulated and packed tightly in a stuffing box at the entry into the supporting arm, to prevent chafing and shut off all water from entering the pipe with the wires.



Support for Pipe Straightener

WITH the expansion in the use of small-diameter drill pipe (3½ in.) necessity for pipe straightening becomes more prevalent. Many rigs operating in deeper fields are equipped with a pipe-straightening machine and each contracting firm in such areas has at least one of these machines available. Two supports are made from old drill pipe; the legs of the supports are equipped with short sections of pipe about 16 in. long which run parallel to the skid on which the machine is mounted. Timbers may be used for cribbing to get the machine at right height.

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MOST International Industrial Power dealers' service shops today are just as busy as the one shown above. Skilled servicemen who are *specialists* in motor and equipment overhaul are doing their wartime best.

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Steel Products for Military Use
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Tank Transmissions
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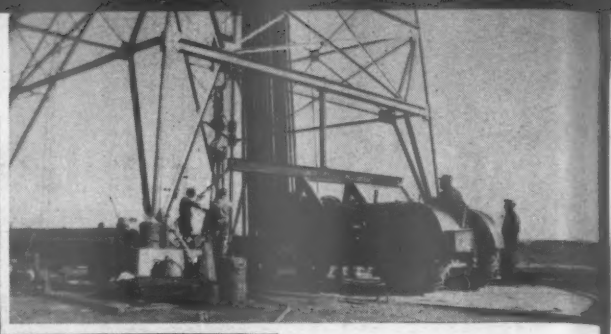
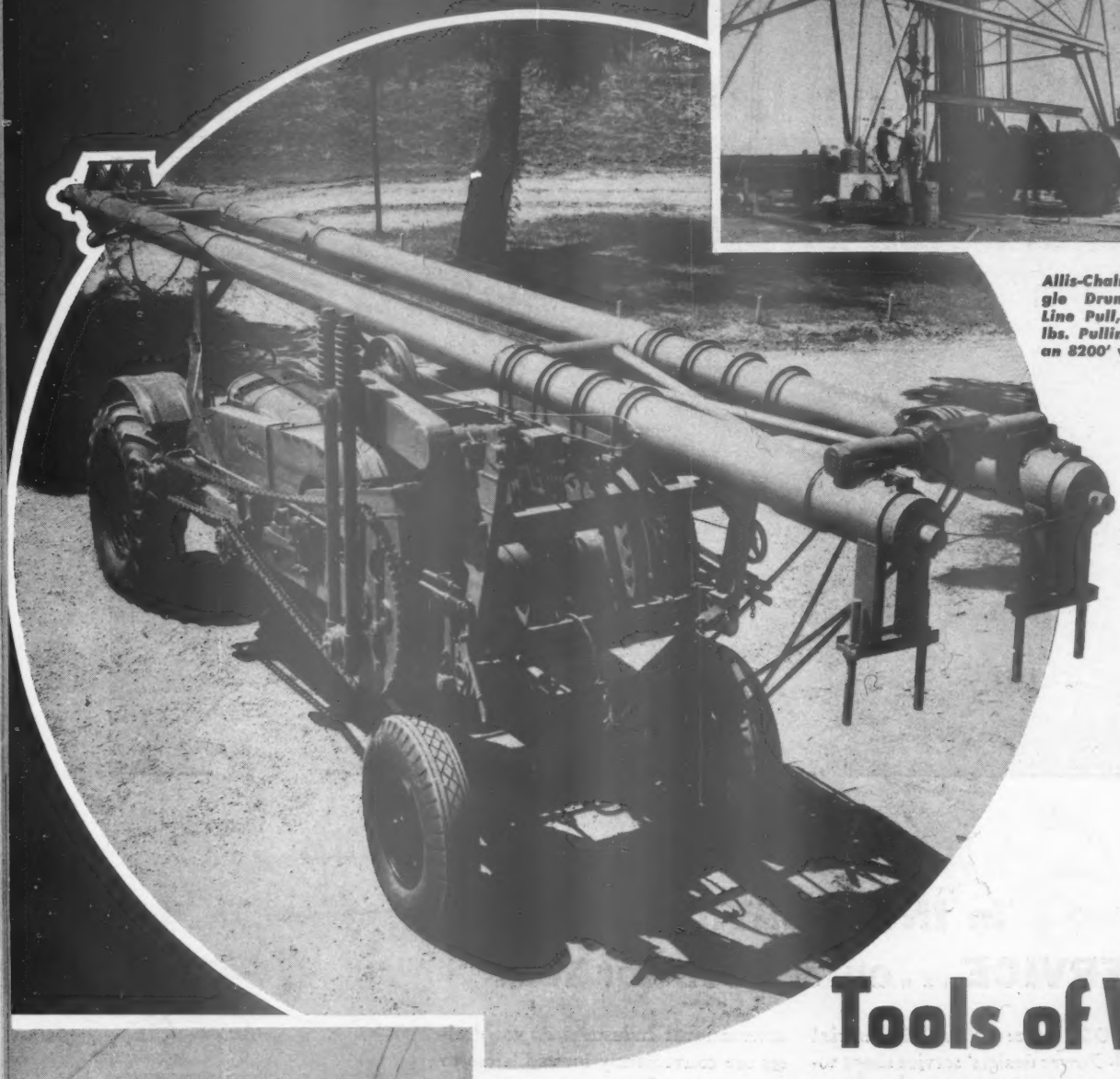
Airplane Engine Cowling Assemblies
Trackers Gun Loaders
Marine Corps Invasion Ice Chests
Blood Bank Refrigerators



Allis-Chalmers Model E Single Drum Winch Tractor. Line Pull, maximum 58,970 lbs. Pulling 2½" tubing on an 8200' well.



Tools of War for the OIL PRODUCER

The importance of this equipment increases with the demand for oil. The necessity of producing more oil, under present conditions, has proved again that ALLIS-CHALMERS Well Servicing Equipment is built to do the job.

Where shortages and breakdowns have occurred with automotive powered equipment, ALLIS-CHALMERS, heavy duty, Servicing Units have taken-up the slack and kept the wells producing.

If your well servicing equipment is not standing-up under war time operations, or you are finding it difficult to secure Parts and Service on your equipment—why not get the low-down on ALLIS-CHALMERS, tractor type Units, designed, sold and serviced by one organization—the largest.

Allis-Chalmers Model L, Single Drum Winch Tractor. Line Pull, maximum 66,730 lbs.

Pipe Wiper Facilitates Use of Spinning Line to Break Joint

WITH the present need to run all steel equipment to a little beyond its limit, fishing jobs on a rotary rig may be expected more frequently. Formerly, when a string of pipe began to develop twistoffs and breakoffs to an excessive degree, the entire string was laid down and replaced. The tendency now is to try to get a few more thousand feet of hole from the pipe before junking it.

Another contributing factor is the realization that in many cases these breakoffs or twistoffs are due to a condition in the hole as much as to the conditions of the drill pipe and installing a new string will only help temporarily. Where embrittlement of the metal is causing the trouble, it is often helpful to lay the pipe on the ground where it will normalize.

Increased fishing places emphasis on one of the incidental improvements in rotary drilling equipment. This is the pipe wiper, that little rubber disk about 14-in. in diameter, which fits snugly around the pipe and removes the mud from the pipe's exterior. This little item has improved the working condition of the roughneck more than any other innovation because it keeps the mud where it belongs—in the hole—and not on the floor where the roughneck will have to wade through it.

Effect on Fishing

The effect of the pipe wiper on fishing illustrates its usefulness. For years coming out of the hole with the fish has been considered a workhouse by the rotary drilling crew. After the overshot has been run and the fish picked up, the driller orders the rotary table locked just to prevent habit getting the better of him to the point where he might kick in the clutch and rotate the pipe.

Normally when coming out of the hole, the joint is broken with the tongs and then the pipe in the hole rotated so as to unscrew it from the stand in the derrick. Rotating of pipe while bringing out a fish is simply not done although it is not necessarily fatal. In fact, there was one case where the driller was sure that he had not caught the fish so he rotated the pipe coming out of the hole only to find that the fish was in the overshot.

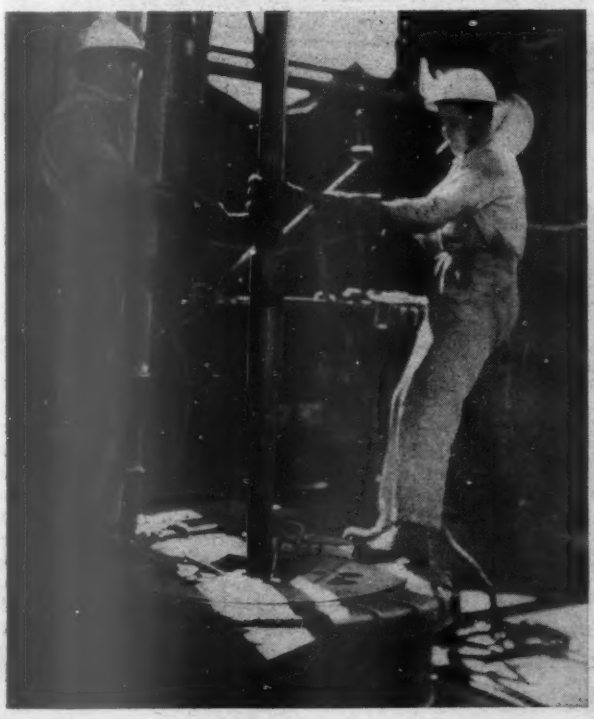
This means that the roughnecks must either unscrew each stand with the chain tongs or spin it out with a spinning line. This latter was always being tried in former days and it would work nicely for a few stands. Then the rope would become so wet that it would not hold on the pipe and this labor-saving device would go by the boards and the chain tongs put into use.

Now the pipe wiper takes care of the mud, the pipe comes through the rotary table almost perfectly dry and an entire string of pipe, 8,000 or 10,000 ft. in length, can be spun out in 90-ft. sections without even getting the rope damp. The only thing necessary is for the backup man to remember that the rope has to be coiled so that it unwinds to the left instead of the right and it has to be put over the pipe before the elevators are latched preparatory to pulling another stand.

Of course, spinning pipe out is a little more difficult than spinning it

(Continued on Page 80)

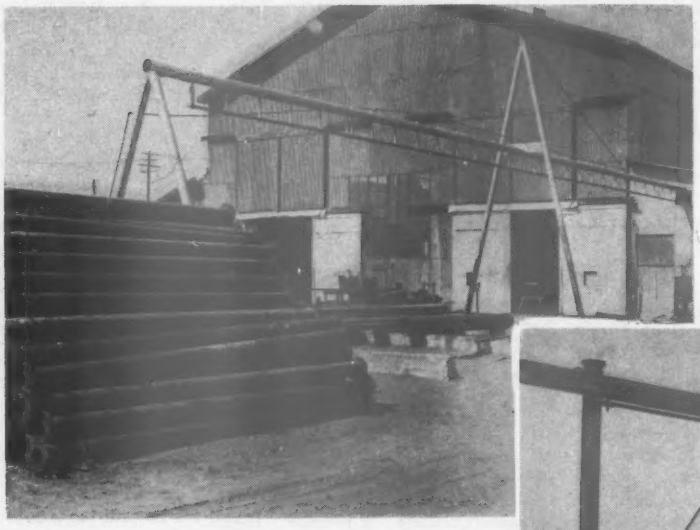
Left: Pipe ready to spin out. As rope is pulled toward observer, pipe turns to left. Note absence of mud on tool joint threads on pipe rack, one of the benefits of using a pipe wiper. Right: Pipe unscrewed and ready for driller to pick up. When spinning out pipe no load is left on the hook. Note the rope is perfectly dry in spite of its being used to spin out about 60 stands



PLANT PRACTICES

Refinery Gate Operated by Electric Hoist

THE main vehicle gate of one Oklahoma refinery is operated by a 500-ton electric hoisting unit (shown at top right-hand side of gate in the accompanying picture) which was converted from other service. The two sections of the gate are suspended from the overhead track. The hoist operates the gates through cables which move over sheaves in each end of the track, operating the two sections in opposite directions to open and close the gate. The hoist is controlled from a switch in the gateman's house. The gate cannot be opened by hand. No alterations were necessary in the hoisting unit. The lifting chain exerts its pull to the endless cable through a sheave connection at the bottom of gate below unit.



Overhead Hoist Track for Refinery Pipe Yard

A REFINERY machine shop has been equipped with an overhead track extending out over the pipe yard to facilitate handling of piping and other heavy equipment to be moved in and out of the shop. A small hand-operated chain hoist rolls on the track for lifting the piping. It enters the shop through an opening in the side which is kept closed when not in use. The frame supporting the track was constructed in the shop from old pipe. An A-frame with suspension cables provides reinforcement support for the mid-section of the track.

Old Glass Jars Are Utilized As Containers in Plant Shop For Small Repair Parts

IN the electrical repair shop of a gasoline plant the operator has devised a handy means of keeping small parts, such as screws, nuts, clamps, etc. Use is made of a number of mayonnaise jars. The metal tops of these jars are nailed in rows along the under sides of shelves. The jars containing the small parts screw into the tops, where they are held up out of the way. With the various small parts always in view through the glass, much time is saved in hunting around through numerous boxes or drawers for what is needed.

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For Pumping Wells, Gasoline or Other Petroleum Products

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For pumping wells, for circulating or transferring petroleum and its products, and for many other operations in your industry where electric motor drives should be used, you'll find the correct Century Motor especially well fitted for each particular application.

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Where public service current is not available, a Century Type ARRC Generator will provide adequate, continuous, economical power. Depending on the load per motor and size of Generator, from 10 to 30 wells can be pumped from one generator alone.

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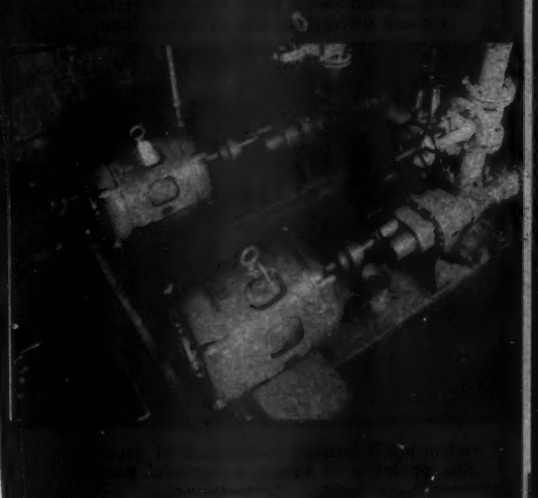

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PROGRESS IN METALS

by W. L. Nelson

Vanadium Discovery

DEPOSITS of vanadium ore which will greatly bolster or perhaps supply our needs for vanadium have been announced by the information service of the Department of the Interior. The deposits were discovered and have been investigated by the Geological Survey. Certain shales and mudstones interdispersed in phosphate rock deposits throughout parts of Idaho and Wyoming are source of the vanadium. The phosphate deposits have long been known and they have even been worked commercially for phosphate fertilizer.

"Back in 1911," the Geological Survey reported, "Survey geologists were studying the phosphate beds of Idaho and western Wyoming in preparation for the day when our eastern phosphate beds would be depleted and full knowledge of our western reserves would be suddenly demanded. As is usual, samples of the phosphate rock were carefully analyzed in the survey's chemical laboratories. Those analyses revealed among other things the present of small amounts of vanadium with the phosphate.

"In 1937, W. W. Rubey, a survey geologist with many years of outstanding work behind him, took over the phosphate studies. . . .

"Throughout the next 3 years, Rubey collected many more samples of the Phosphoria formation, carefully recorded the place of each sample in the rock sequence and had them analyzed. One day the chemist reported on his analysis of some of the rocks that are associated with the phosphate layers. It was found that some inconspicuous and unimportant appearing dark shales and mudstones contained much more vanadium than did the phosphate rock itself. This was new and prospectively important.

"In the winter of 1939 and 1940, the geological search was shifted from fertilizer to the steel alloy metal. All the trenches that had been laboriously dug in the mountain slopes in earlier years were carefully plotted, foot by foot, and the available analyses were plotted against them. An old fertilizer prospector's diggings along a gulch at the foot of Sublette Ridge, abandoned a quarter of a century ago, gave a rare opportunity to the searchers for cross-section sampling. This lone chance for such sampling in the radius of a day's horseback ride fortunately yielded a high assay which led the searchers on. Some of the analyses, unlike those of the phosphate beds themselves, indicated a vanadium content rich enough to mine.

"In the spring of 1942, Rubey again entered the field with the new data in hand to test the concept that had been slowly forming in his mind, namely, that a single obscure bed of workable thickness carried vanadium in commercial quantities and that the bed had wide extent. He established a field laboratory for rapid analyses on the ground. More trenches were dug, more samples taken and analyzed. The Bureau of Mines assigned engineers to the project. The bed proved to be vanadium bearing nearly everywhere and its position and attitude were mapped. When all of these facts were established and the mapping had been completed, the data were turned over to the Bureau of Mines, the War Production Board, and the Metal Reserve Co."

After careful checking by the Bureau of Mines, War Production Board, and the Metal Reserve Co., the more promising public lands were withdrawn from mineral entry by Secretary Ickes, and a development contract was written with the Homestake Mining Co. Development tunnels are being driven into the canyon walls of the Sublette Ridge and vanadium is expected shortly to flow from the "strike" through the nation's industrial system to the far-flung battle line of democracy.

Vanadium is the most powerful of the elements commonly used in alloy steel. The percentage of alloy element used in common low-alloy high-strength steels is somewhat as follows:

	Per cent
Vanadium	0.1
Molybdenum	0.25
Chromium	0.6
Manganese	1.1
Nickel	3.5

This advantage of vanadium has not been of great importance in the past because of its high cost but this situation may be entirely altered if the new development in Idaho and Wyoming is good enough to produce cheap abundant vanadium.

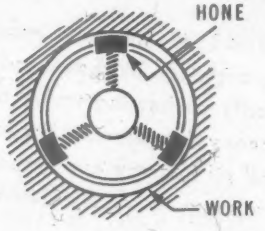
Although the supply and sources of vanadium were thought to be adequate during 1941, it was listed a few weeks ago as the third most critical of the metals used for the alloying of steel, being preceded by molybdenum and nickel. About half of our supplies of vanadium have recently been coming from Peru.

This element has been used, at least experimentally, in the steels used in every important oil refinery and oil production service. Lists of such steels and the oil services for which they were used have been published in a series of articles in The Oil and Gas Journal between August 1939 and May 1941.

Metal-Working Terms

Honing

Honing may be considered as a phase of grinding in which the wheel is usually made in segments, each segment being able to adjust itself to irregularities in the surface. The segments of the wheel each carry a stone and the pressure applied by the stones upon the work may be regulated to give a wide variety of finishes. It is obvious that many types of mechanisms can be devised for honing but one of the most common is an arrangement of three stones which are pressed outward against the interior walls of a cylindrical object by means of springs as indicated in the figure on this page. Pressure may, however, be applied to the stone by hydraulic pressure as well as by mechanical devices such as springs. Tapering of the inside of cylinders is avoided by the use of a reciprocating motion as well as a rotating motion, or by the use of long stones. An abrasive is usually fed between the stone and the work.



Plants and Plantations

Plantations half across the world—that's where our peacetime rubber used to come from

Plants right here in the U.S.A.—that's where the rubber is coming from that we must have to win the war The first of several plants is already in operation

Plantation rubber is natural—it's made from the sap of a tree Plant rubber is synthetic—it's made from butadiene and styrene produced from crude oil in American refineries

Butadiene and styrene are derived from petroleum by Universal processes, which can make us forever independent of rubber plantations 10,000 miles from home

Do you think production of synthetic rubber will end with the war?

The oil industry never goes backward

OIL IS AMMUNITION—USE IT WISELY CARE FOR YOUR CAR FOR YOUR COUNTRY

Universal Oil Products Co
Chicago, Illinois

Dubbs Cracking Process
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THE REFINERS INSTITUTE OF PETROLEUM TECHNOLOGY

Practical Refining Series—Part 7

Approximate Capacity Of Topping Tower

by W. L. Nelson

IN these times when operators must hastily fish about for used equipment or must juggle their processing operations to meet such equipment as is available, it is particularly useful to be able to judge quickly the capacity of a fractionating tower before resorting to involved computations.

For normal topping towers having 20-24-in. tray spacings, and a normal number of caps, the capacity in thousands of barrel per day is equal, approximately, to the diameter square divided by 4.5 and multiplied by the percentage of residue. Thus:

$$\text{Capacity} = \frac{1{,}000}{4.5}\,(\text{Dia.})^2\,(\%\ \text{Resid.})$$

$$\text{or} = 220\,(\text{Dia.})^2\,(\%\ \text{Resid.})$$

Stated in reverse:

$$\text{Diameter} = \sqrt{\frac{4.5\ (\text{b.p.d.})}{1{,}000\ (\%\ \text{Resid.})}}$$

For ease in remembering the formula, the constant 4.5 might be replaced by 5 which would give conservatively low diameters and capacities.

Obviously, the relationship is not perfect because of the many different processing operations that are conducted under the name of topping, and because of differences in the properties of crude oils. These differences can, of course, be taken into account in an equation, but in so doing the computation becomes so complicated that its usefulness is lost. The relationship should, however, be applied only to towers in which substantially all of the topping is done in a single tower—**not** applied to tower systems in which the bottoms from one tower is reheated and sent to another tower (or several of them).

The following tabulation indicates the general accuracy of the method; the data are plant operations which happened to be readily at hand. It will be noted that at large percentages of residuum (light topping, the computed capacities are conservatively low:

Plant—	Dia. (ft.)	Per cent resid.	Cap., b.p.d. Actual	Cap., b.p.d. Est.
A	5.5	33	2,150	2,200
B	4.5	71	3,500	3,220
C	3.8	37	1,200	1,190
D	3.0	73	1,600	1,460
E	3.5	85	2,600	2,320
F	4.6	30	1,500	1,380
G	3.76	47	1,500	1,490

In order to indicate the range in tower size, as a function of percentage residue (or per cent topped), Fig. 1 was computed by means of the above statement or formula. Finally, similar information, but pertaining to the capacity of towers of various diameters is given in tabular form, as follows:

Capacities of Topping Towers

Dia. of tower, feet—	30% resid.	50% resid.	70% resid.
3	600	1,000	1,400
4	1,100	1,800	2,500
5	1,700	2,800	3,900
6	2,400	4,000	5,600
8	4,300	7,100	9,800
10	6,700	11,000	15,000
12	10,000	16,000	22,000

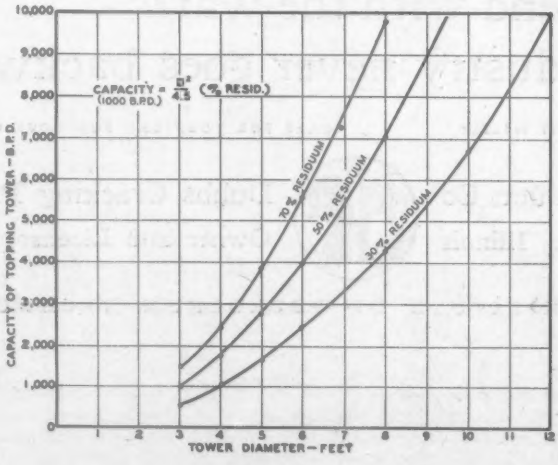


Fig. 1.

Oil Shale and Shale Oil

(Continued from Page 55)

tract into marketable products with high yields, it must be further treated by hydrogenation as in the case of high-molecular petroleum oil or coal extract.'"[1] In most cases, the solvent may be completely or nearly completely regenerated.

"Instead of employing extraction followed by hydrogenation, higher oil yields than those obtained by carbonization may be achieved by direct hydrogenation of oil shale. A practically complete conversion of the organic material present in the oil shale may be obtained by hydrogenation, which is the normal method employed to convert coal as completely as possible into gasoline, diesel oil, etc."[1] Economics of such a process differ from those for coal, where it is frequently more profitable to carbonize the coal and hydrogenate the tar obtained, since in the case of oil shale hydrogenation "gives in general a higher yield on the organic material than coal on carbonization,"[1] and the residue has a little value, unlike coke.

"Hydrogenation of oil shale may be carried out in the same way as coal, the shale being pasted with heavy oil and subjected to hydrogenation under the same conditions of temperature, pressure, and catalysis."[1] Depending upon what products are desired, it is possible to produce a mixed product of heavy oil, middle oil, and gasoline, but it is also possible to carry out the reaction in such a manner as to produce only gasoline and middle oil.

"Compared with coal hydrogenation, oil shale possesses the disadvantage that large quantities of ash must be conducted through the high-pressure reaction space and subsequently separated from the oil. On the other hand, the comparatively low consumption of hydrogen is a decided advantage."[1]

Hydrogenation of oil shales, incidentally, replacing as it does the oxygen, sulfur, and nitrogen with hydrogen, yields superior hydrocarbon oils, which do not, however, contain the byproducts previously mentioned.

Since extraction and hydrogenation are recent developments, it is as yet too early to determine if the higher yields obtained counterbalance possible disadvantages and can be justified on an economic basis. The subject of carbonization of shales followed by hydrogenation of the oil obtained will be discussed later.

The production of oils from oil shales, therefore, must be considered a problem of carbonization until proved otherwise. While the literature on this process is extremely voluminous, it is believed that considerable research might be required before a large-scale industry could be developed in the United States. No shale oil has been produced since 1930.

NOTE: Bibliography follows Part 2.

ANALYSIS OF RISK IN CEMENTING JOBS

A GREAT variety of tests are used in the producing branch of the oil industry to obtain information on which to outline a procedure. After the information is obtained it must be interpreted following which it must be acted on. One such test is the recording of the temperature in a well, or the running of a temperature survey, while the cement is setting behind the pipe.

The purpose of this test is to establish the top of the cement behind the pipe, i.e., how much of the pipe is encased by a cement sheath. A definite temperature rise, or kick, is registered when the instrument in the hole comes opposite the cement. Unfortunately, the instrument does not record whether the cement is completely around the pipe and that it has not been channeled. Generally, temperature surveys will show a stringer of cement considerably above the true top of the cement which is a good indication that a certain amount of channeling takes place.

Value of Temperature Survey

With some companies the running of a temperature survey is a matter of form but with others it is run only in cases where there is some doubt as to how much fillup was obtained behind the pipe with the volume of cement used. This naturally varies with the cavitation in the well bore and with the permeability of the formations behind the pipe. In some cases these thief zones will take the cement so readily that there is little or no fillup above them.

In many cases it is essential for protection of the casing and of the well that the cement be in place for a considerable distance above such zones. Where the temperature survey shows that the cement has not risen high enough, perforation of the casing and squeezing cement into the annulus is generally resorted to.

Fortunately, or unfortunately, the producing department always has a number of alternate procedures open to it when completing a well, and some decision must be made in the matter. Where only one course is open the solution is easy. However, where there are alternatives one must make some evaluation of the materials, time required and the quality of the completion obtained.

Choice of Methods

One never knows whether in a particular case some other course might have been better and consequently must operate on principles dictated by experience. This leads some companies to operate on a basis of insurance against a bad job at any cost and others on a basis of assuming risks in the belief that the money saved by several successful attempts will more than pay for a bad job. The correct choice is a matter of personal temperament as a conservative will never be satisfied if he takes a risk and difficulty develops, whereas the more venturesome individual will never be completely happy refusing a hazard in an attempt at a short cut.

It cannot be denied that attempts to reduce costs by attempting a short cut often results in expensive remedial jobs. A recent Mid-Continent well illustrates the point.

This wildcat well showed a possible producing zone at 4,800 ft. and another at 6,000 ft. As is the custom in such cases, pipe was run to test the lower horizon first and a temperature survey showed the cement top to be 4,600 ft. or 200 ft. above the upper producing zone. The lower zone proved noncommercial so the completion in the upper zone was in order.

There was a choice of procedures based on the information available and the realization that the primary purpose of cementing the casing is to exclude fluids from upper zones from the pay horizon. The pipe could be perforated near the top of the cement as shown by the temperature survey and more slurry forced into the annulus and the thief formation indicated, or the pipe could be perforated opposite the pay and the well completed in the hopes that the original cement job would hold.

The latter plan was followed with the result that as soon as the pay zone was perforated, pressure developed outside the casing, indicating that the cement behind the pipe was not providing a satisfactory shutoff. Two squeeze cement jobs were run but when the well was acidized it showed the cement was not holding. Another squeeze cement job followed by an attempt to acidize indicated tthat the shutoff was not complete. A fourth squeeze cement job was performed and the well acidized with 4,000 gal. after which it was successfully completed.

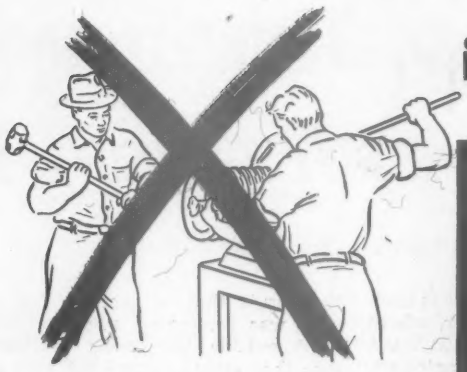
The total material used amounted to over 500 sacks of cement and 9,000 gal of acid, with 20 days being required to do the work. Including labor, rig time and service charges the total cost of the completion ran close to $10,000.

Element of Risk

If the other choice had been selected and the cement squeezed behind the pipe before an attempt was made to complete the well, some time might have been saved and a better completion obtained. However, there is no certaintly that such would have been the case. Probably the same amount of cement would have been required, the time requird would have been about 5 days and the cost of 5,000 of the 9,000 gal. of acid and tthree-fifths of the service charges would have been saved.

On the other hand, if the original cement job had been satisfactory for the purpose, the completion would have required only 3 days with no expense for service charges other than the necessary perforating of the pipe. In other words the attempt could be made to complete the well for about $1,500 with the chance that in case things did not go properly it would cost around $10,000, or $3,000 to $4,000 could be expended with reasonable assurance that a satisfactory completion would be obtained. The problem thus became one saving $1,500 to $2,500 while risking $7,500 or to spend $1,500 to $2,500 extra to eliminate a possible expense of $6,000 to $7,000.

A wrench will get it on or off in *Sixty Seconds*



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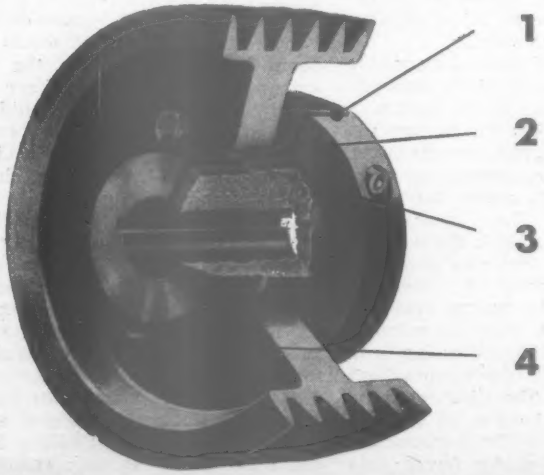

1. **SPLIT HUB** for easy mounting or removal from the shaft.
2. **TAPERED FIT** between split hub and rim for easy mounting or removal of rim from hub.
3. **PULL-UP BOLTS** which pull the rim onto tapered split hub for tapered friction drive assembly and positive press fit on the shaft.
4. **TAPPED HOLES IN RIM** for using pull-up bolts as jack screws to free the tapered friction fit when detaching the rim.

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ELEMENTS OF COST IN EMULSION BREAKERS

THE breaking of emulsions produced from an oil well and the separation of the oil and water requires a procedure specially designed for each case. However, practically all treatments depend on the application of chemicals and heat, the exact amount varying according to emulsion being handled. The objective is to reduce both chemicals and heat required to minimum as the former have a rather high direct cost and the latter requires fuel and causes loss of gravity in the oil and damage to the heating equipment.

At the present time there is available a well-designed heater or treater to meet practically any emulsion-breaking problem but a number of operators continue to use the old thermosiphon system consisting of a gun barrel, small boiler and water leg. The unfortunate part of such systems is that they are rarely thermosiphon in their action but are more accurately percolation systems. The practical result is that too much heat and chemical must be used to effect the desired result and the boiler doesn't last long.

Cost of Equipment

Cost of commercial heating equipment for emulsion breaking runs anywhere from $200 for a simple direct-fired heater capable of handling 5 bbl. per hour with a 120° F. temperature rise to $3,200 for a stage treater which will handle 76 bbl. per hour with a 100° F. temperature rise. The treater completes separation of the oil from the water, the latter fluid being drained from the bottom and the clean oil being run direct to the stock tanks. The heater simply raises the temperature after which the heated oil is run to the gun-barrel tank where segregation takes place.

The more commonly used heaters include the vertical and horizontal types, the choice depending on the operator or on specific requirements. There are also direct and indirect heaters, the latter having the tubes carrying the emulsion immersed in water to which heat is applied. Some heaters are of the tubular type while others are of the pot or volume type. Cast iron is used in preference in a number of heaters because of its resistance to corrosion.

Tubular heaters are preferred in some cases because the tubes and return bends can be made of cast iron and hence more corrosion resistant. They also can be made to operate at higher pressure on the emulsion (as much as 300 lb. per sq. in.), whereas most heaters operate below 25 lb. per sq. in. pressure. The indirect heater, which is used to a great extent for gas heating but which many prefer for heating oil, operates at extremely high pressure (up to 5,000 lb. per sq. in.) on the produced fluid and 25 lb. per sq. in. pressure on the water. This latter pressure permits steam to be used instead of water, if the operator prefers.

Regardless of whether it is a treater or heater, the same general rules apply for its care. The most frequent abuse, and the one which costs the operator the most money, is failure to keep the vessel clean. Any vessel depending on the transfer of heat from fire to a fluid through metal generally accumulates some type of deposit. This deposit prevents heat transfer from the metal to the emulsion and consequently the metal becomes overheated and fails.

Treatment of Deposits

Salt is the most common deposit in a heater or treater although frequently shale, drilling mud or a calcareous material may accumulate. Salt can be removed by washing with fresh water and often shale and dried drilling mud can be removed the same way. The time between washings of the vessel depends on the crude being handled. In Michigan, for instance, once a week is not too often.

If the scale cannot be removed by washing, the fire box will have to be pulled and the material removed with a blunt chipper or scraper. Calcareous deposits can be removed from tubular heaters by an acid solution. However, if the vessels are kept clean, and washed at the proper intervals, the need for chipping will be greatly reduced if not eliminated.

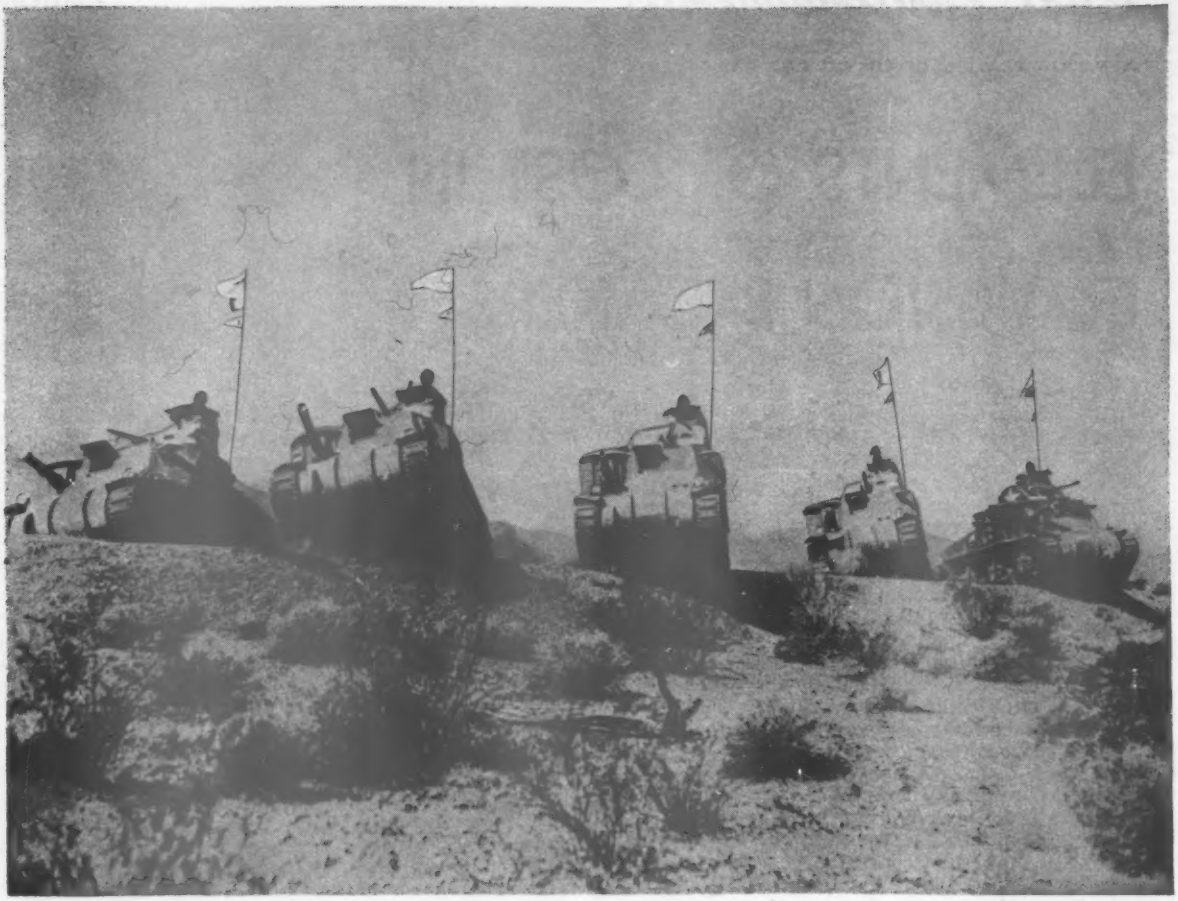
Use of a moderate temperature prevents much trouble as the more heat that is applied, the quicker scale will form. Then more fire must be used to obtain the treating temperature with the result the scale deposit is increased. The proper treating temperature should be determined and then maintained.

Effect of Increasing Heat

Increasing the heat generally results in the use of less chemicals but there is little saving in elevating the treating temperature 10° or 20° to save a pint of chemical. The greater fuel use offsets the reduced chemical cost and the added charges for losses in the lighter ends of the crude oil and for damage to the heater must be added to the treating charges.

Dirty or wet gas also adds to the cost of operating a heater or treater or causes it to perform unsatisfactorily. The foreign material from dirty or wet gas clogs up the automatic controls and prevents their proper functioning. A drip, or basin, installed ahead of the regulator in the gas line will collect this material and prevent its doing any damage. The drip should be drained frequently and should be kept clean.

The other factor which adds unnecessarily to the cost of operating heating or treating vessels is common to all types of equipment using automatic control, i.e., tinkering with the controls by the one in charge of it. No attempt should be made to adjust the regulator or the automatic thermostat by one who is not an expert on these items. They should not be hammered or hit under any consideration. In case they do not function properly, a service man from the company making the vessel should be called.



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COMPARISON OF ONE-STAGE AND TWO-STAGE COMPRESSION

IN compressing gas, if a pressure ratio greater than about 5 is used in a cylinder the gas temperature becomes excessively high. This may cause trouble with the lubrication of the cylinder and piston and may result in damage to the compressor valves. By using two stages, with the gas passing through intercoolers between stages, gas can be pumped through an over-all pressure ratio up to about 25 without excessive temperatures resulting in the cylinders of either stage. Furthermore, it is possible to save considerable power by using two stages rather than one if the pressure ratio falls between 5 and 25. Also, the volumetric efficiency of a two-stage compressor will be greater than that of a single-stage machine of the same clearance when pumping through the same pressure ratio. Still another advantage of two-stage compression lies in the fact that piston rod loads can be kept lower for a given compressor capacity than if the compression were carried out in a single stage.

Temperature Rise

The relationship expressing the temperature rise that occurs during compression of a gas is:

$$T_2 = T_1 R^{(n-1)/n} \qquad (1)$$

where

T_2 = temperature of the gas leaving compressor cylinder, °F., abs.

T_1 = temperature of the gas entering the compressor cylinder, °F., abs.

$R = P_2/P_1$ = pressure ratio.

n = exponent of compression.*

Equation 1 can be used for comparing the final temperature that can be expected when using a single-stage machine with the final temperature that can be expected when using two stages. Values of the factor $R^{(n-1)/n}$ are given in Table 1.

*See Installment 80.

The intermediate pressure in two-stage compression should be so chosen that each stage will have the same pressure ratio. By so doing, the work of compression will be equally divided between the two stages.

Then, the expression for calculating the intermediate pressure is:

$$P_2 = (P_1P_3)^{1/2} = P_1(R_t)^{1/2} \qquad (2)$$

where

P_1 = intake pressure to low stage, lb. per sq. in., abs.

P_2 = discharge pressure from low stage, or intake pressure to high stage, lb. per sq. in., abs.

P_3 = discharge pressure from high stage, lb. per sq. in., abs.

(Continued on Next Page)

TABLE 1—Values of $R^{(n-1)/n}$ for Use in Calculating Temperature Rise of Compression

Pressure ratio, R	Value of exponent, n									
	1.05	1.10	1.15	1.20	1.25	1.30	1.35	1.40	1.45	1.50
1.4	1.016	1.031	1.045	1.058	1.070	1.081	1.091	1.101	1.110	1.118
1.6	1.023	1.044	1.063	1.081	1.098	1.114	1.130	1.143	1.157	1.169
1.8	1.028	1.055	1.080	1.103	1.125	1.145	1.164	1.182	1.200	1.216
2.0	1.034	1.065	1.095	1.122	1.149	1.174	1.197	1.218	1.240	1.260
2.2	1.038	1.074	1.108	1.140	1.171	1.200	1.227	1.252	1.277	1.300
2.4	1.043	1.083	1.122	1.157	1.191	1.224	1.254	1.284	1.312	1.339
2.6	1.047	1.091	1.133	1.172	1.211	1.247	1.281	1.313	1.345	1.375
2.8	1.050	1.098	1.144	1.187	1.228	1.268	1.306	1.341	1.377	1.410
3.0	1.054	1.105	1.154	1.200	1.246	1.289	1.330	1.368	1.407	1.442
3.2	1.057	1.111	1.164	1.214	1.262	1.308	1.352	1.394	1.435	1.473
3.4	1.060	1.117	1.173	1.226	1.277	1.327	1.373	1.418	1.463	1.504
3.6	1.063	1.123	1.182	1.238	1.292	1.344	1.394	1.441	1.489	1.532
3.8	1.066	1.129	1.190	1.249	1.306	1.362	1.414	1.464	1.514	1.560
4.0	1.068	1.134	1.198	1.260	1.319	1.377	1.432	1.486	1.538	1.586
4.2	1.071	1.139	1.206	1.270	1.332	1.393	1.451	1.506	1.562	1.613
4.4	1.073	1.144	1.213	1.280	1.345	1.408	1.468	1.526	1.584	1.638
4.6	1.075	1.149	1.220	1.289	1.356	1.422	1.485	1.546	1.606	1.662
4.8	1.078	1.153	1.227	1.299	1.369	1.437	1.502	1.565	1.628	1.686
5.0	1.080	1.158	1.233	1.308	1.380	1.450	1.518	1.584	1.648	1.709
5.5	1.084	1.168	1.249	1.328	1.406	1.482	1.556	1.626	1.699	1.765
6.0	1.089	1.177	1.263	1.348	1.431	1.513	1.591	1.668	1.774	1.817
6.5	1.093	1.185	1.276	1.366	1.454	1.541	1.624	1.707	1.788	1.865
7.0	1.097	1.193	1.289	1.383	1.476	1.567	1.656	1.742	1.830	1.912
7.5	1.101	1.201	1.300	1.399	1.496	1.593	1.686	1.777	1.869	1.957
8.0	1.104	1.208	1.311	1.414	1.515	1.616	1.714	1.811	1.907	2.000
8.5	1.107	1.214	1.322	1.429	1.534	1.639	1.741	1.842	1.942	2.040
9.0	1.110	1.221	1.332	1.442	1.552	1.661	1.767	1.872	1.978	2.079
9.5	1.113	1.227	1.341	1.456	1.569	1.682	1.793	1.902	2.012	2.117
10.0	1.116	1.233	1.350	1.468	1.584	1.702	1.816	1.930	2.043	2.153
12.0	1.125	1.253	1.383	1.513	1.644	1.775	1.902	2.032	2.162	2.287
14.0	1.134	1.271	1.411	1.552	1.695	1.839	1.982	2.124	2.269	2.420
16.0	1.141	1.286	1.436	1.588	1.741	1.898	2.100	2.205	2.365	2.520
18.0	1.147	1.304	1.458	1.619	1.783	1.950	2.115	2.283	2.455	2.630
20.0	1.153	1.313	1.478	1.647	1.820	1.988	2.173	2.350	2.535	2.715
22.0	1.158	1.324	1.497	1.674	1.856	2.042	2.255	2.415	2.515	2.800
24.0	1.163	1.334	1.514	1.698	1.888	2.083	2.277	2.477	2.083	2.880
25.0	1.166	1.340	1.522	1.710	1.904	2.103	2.303	2.505	2.720	2.920

Engineering Fundamentals

A WEEKLY FEATURE OF THE OIL AND GAS JOURNAL

R_t = over-all pressure ratio.

It can be seen from Equation 2 that the pressure ratio in the low-stage cylinder, P_2/P_1, is equal to the square root of the over-all ratio, R_t.

When calculating the horsepower required for two-stage compression, the two stages may be considered separately, and thus the required horsepower will be the sum of the horsepower for the two individual stages. Expressing this in one equation:*

$$\text{Hp.} = 0.0445\, V_s \frac{n}{n-1} \left(R_1^{(n-1)/n} + R_2^{(n-1)/n} - 2\right) \quad (3)$$

where

V_s = volume of gas compressed, thousands of standard cu. ft. per 24 hr. (Standard pressure is 14.7 lb. per sq. in., abs.)

n = exponent of compression.

R_1 = pressure ratio in low-stage cylinder.

R_2 = pressure ratio in high-stage cylinder.

If the ideally correct intercooler pressure is used, the pressure ratios of the two stages are equal to each other and Equation 3 becomes:

$$\text{Hp.} = 0.089 V_s \frac{n}{n-1} \left[(R_t^{1/2})^{(n-1)/n} - 1\right] \quad (4)$$

The pressure ratios of the two stages are controlled by the relationship existing between the volumetric displacements of the cylinders of the two stages. This will be discussed in detail later in this series. At any rate, it is not always possible to so adjust the volumetric displacements of the two stages that equal pressure ratios will be obtained. If such is the case, Equation 3, rather than Equation 4, must be used in calculating the horsepower.

*Derived from Equation 4 of Installment 76.

Example

Problem: It is desired to compress 2,500,000 standard cu. ft. of gas per 24 hours from 50 lb. per sq. in., abs., to 600 lb. per sq. in., abs. Intake temperature is 60° F. n = 1.25.

1. For one-stage and two-stage compression, compare each of the following items:

(a) Final temperature of gas, °F.

(b) Horsepower required in compressor cylinders.

2. What intermediate pressure should be used?

TABLE 1

Square Roots of Overall Pressure Ratio for Use in Two-Stage Compression Calculations

R_t	$R_t^{1/2}$
5.0	2.24
5.5	2.35
6.0	2.45
6.5	2.55
7.0	2.64
7.5	2.74
8.0	2.83
8.5	2.92
9.0	3.00
9.5	3.08
10.0	3.16
10.5	3.24
11.0	3.32
11.5	3.39
12.0	3.46
12.5	3.54
13.0	3.61
13.5	3.67
14.0	3.74
14.5	3.80
15.0	3.87
15.5	3.94
16.0	4.00
16.5	4.06
17.0	4.12
18.0	4.24
18.5	4.30
19.0	4.36
19.5	4.41
20.0	4.47
20.5	4.53
21.0	4.58
21.5	4.63
22.0	4.69
22.5	4.74
23.0	4.80
23.5	4.85
24.0	4.90
24.5	4.95
25.0	5.00

Solution: (1) First, assume that perfect intercooling is to be used in the two-stage compressor. That is, the gas is to be cooled back to 60° F. before entering the high stage. Also assume that the proper intermediate pressure is to be used.

(a) If the gas is to be compressed in one stage the final temperature may be calculated as follows:

$T_1 = 60 + 460 = 520°$ F., abs.

$R = 600/50 = 12$

From Table 1, when $R = 12$ and $n = 1.25$, $R^{(n-1)/n} = 1.644$

Then

$T_2 = 520 \times 1.644 = 855°$ F., abs., or $395°$ F.

If the gas is compressed in two stages

$$R_1 = R_2 = (R_t)^{1/2} = (12)^{1/2} = 3.46$$

From Table 1, when $R = 3.46$, and $n = 1.25$, $R^{(n-1)/n} = 1.281$

Then, $T_2 = 520 \times 1.281 = 666°$ F., abs., or $206°$ F.

(b) Using Equation 4 of No. 76 and Table 1 of this installment, for one-stage compression:

$$\text{Hp.} = 0.0445 \times 2{,}500 \times 1.25/0.25 \times (1.644 - 1) = 358$$

For two-stage compression, using Equation 4, and Table 1:

$$\text{Hp.} = 0.089 \times 2{,}500 \times 1.25/0.25 (1.281 - 1) = 0.089 \times 2{,}500 \times 5 \times 0.281 = 312.5$$

2. The intermediate pressure is calculated using Equation 2 as follows:

$P_2 = 50\ (12)^{1/2} = 50 \times 3.46 = 173$ lb. per sq. in., abs.

Series prepared by Glenn M. Stearns, associate professor of petroleum engineering, University of Oklahoma

Baash-Ross News

BAASH-ROSS TOOL COMPANY · LOS ANGELES · HOUSTON · NEW YORK

OIL & GAS JOURNAL EDITION

The story of another remarkable cutting job performed by a Baash-Ross Pipe Cutter!

For outstanding performance beyond the normal line of duty!

IF MEDALS are ever awarded to mechanical equipment for performances far beyond the service expected of them, the Baash-Ross External Pipe Cutter is a front-rank choice to receive one.

Some time ago this cutter set a world's depth record that has never been even closely approached... 6 *successive cuts at depths in excess of 12,000 feet—the last at a depth of 14,366 feet—over a* THOUSAND feet *deeper* than the world's deepest producing well and only a few hundred feet short of the all-time record drilling depth!

Recently, this External Pipe Cutter successfully completed *another* tough assignment that illustrates beyond the shadow of a doubt the unusual ruggedness and dependability built into the tool. Although designed for cutting tubing and drill pipe—which in itself is a man-sized job—this Baash-Ross Cutter went down 6,800 feet where it cut—and recovered—over 62 feet of 5¾" DRILL COLLAR!

The drill collar had a bore of 2¼"... which means that a solid *1¾ inch* wall of tough, *hardened* alloy steel had to be cut through by the knives of the cutter. *That's over* FIVE TIMES *the thickness of 6⅝" API Drill Pipe*... and far beyond the service for which these cutters are intended!

Of course, we don't recommend drill collar cutting as standard practice for the Baash-Ross Cutter. But this cutting record is further proof that, inherent in *all* Baash-Ross Fishing Tools there is an extra margin of "beyond-specification" performance... a performance margin that means extra safety and efficiency on *every* fishing and work-over job, regardless of the working depth or operating conditions!

These are times when you need every performance advantage obtainable to assure the success of your fishing and repair work. So why not call in your nearby Baash-Ross representative on ALL your fishing operations and get the protection of tools built to perform *beyond* the limits of normal service?

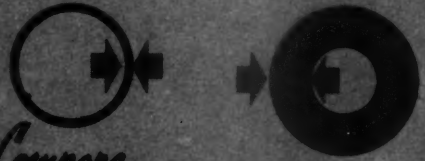
(Baash-Ross Cutters are leased in U.S.A.—Sold for export only)

THE TOOL THAT CUT 1¾" OF SOLID ALLOY STEEL!

The Baash-Ross External Pipe Cutter, in slicing through 5¾" drill collar, cut five times the thickness of 6⅝" drill pipe. Not only that, but drill collars are made of special alloy steel that is hardened and toughened by multiple heat-treatments—*a steel that is much harder to cut than API pipe-steel!*

One of the reasons why the Baash-Ross Cutter can successfully make such a heavy cut is the "cushioned" feed of the knives against the metal. Notice the spring above the knives? Cutting pressure to the knives is transmitted through this spring, thus smoothing out all roughness and vibration as the string rotates. This assures a constant, *uniform* feed throughout the cut-off operation. Contrast this with the rough, chattering action that is apt to occur where pressure is applied directly to the knives without any cushioning spring!

Another important advantage is that no separate overshot is necessary to hold the cut-off section of pipe. This Cutter not only cuts the pipe, but also *supports* it while it is removed from the hole, saving time, extra operations, and increasing the simplicity and safety of making cuts with this tool!



Compare in the scale drawings above, the wall thickness of the 5¾" Drill Collar with that of 6⅝" Drill Pipe. The Drill Collar is over *five times* as thick and—in addition—is made of heat-treated, hardened and toughened alloy steel!

OD of Collar	5¾"
ID of Collar	2¼"
Thickness of wall	1¾"
Size of Cutter used	8⅛" OD
Depth at which cut was made	6800 ft.
Size of hole	9⅝"
Length of Drill Collar removed	62 ft.

AND WE HAD "Real Bread"
"Our boys," in distant lands, get real bread — made the American way in "portable" kitchens. Just another way Briggs & Stratton gasoline motors are serving — furnishing power for bread mixers, refrigerators, water supply and other specialized applications — in addition to scores of major standard uses.
We're in full production on Briggs & Stratton 4-cycle, air-cooled gasoline motors — for the war program and approved "essential" civilian uses — but there are not enough "new" motors available to supply the demand. As a special service, we are trying to place "used" Briggs & Stratton motors that may not now be in active service, in the hands of those who need them so badly.
If you have, or know of any Briggs & Stratton motors not now in regular use—please write us, stating model numbers and general condition. It makes no difference how old they are. We will assist in making contacts between owners and prospective purchasers.
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4 CYCLE
BRIGGS & STRATTON
GASOLINE MOTORS
FOR VICTORY
Invest in
WAR BONDS

Pipe Wiper Facilitates Use of Spinning Line

(Continued from Page 67)

in, but it isn't as tiresome as breaking out with chain tongs.

The pipe wiper definitely has safety value as the wash stream of water formerly used is no longer necessary. On cold wintry nights, the wash pipe frequently became frozen so that the pipe had to be pulled muddy much to the exasperation of the derrick man and pipe racker who had to handle it. Eliminating the wash stream prevented dilution of the mud so that it becomes easier to maintain. The slipping and sliding of the floor men are practically things of the past as the mud is kept in the hole with the exception of that inside the pipe. Tool-joint threads will last considerably longer now that they are not set in about 2 in. of mud on the pipe rack.

Just one other remark about the labor-saving pipe wiper. It prevents small pieces of junk or hand tools from falling down the hole. Formerly the dies in the tong heads often came loose and fell through the rotary hole, thence to bottom. The new bit run in would bounce quite lively grinding up such junk. Now such items can't get down the hole.

In spite of the rubber shortage, this is one item which should be retained on the must list of the oil industry.

BOOK REVIEWS

British Revised Standard Test Method, fourth edition. Institute of Petroleum; London.

The new volume, available now from the Institute of Petroleum at the Imperial College of Science and Technology, Prince Consort Road, South Kensington, London, S.W. 7, England, has been kept in agreement as far as possible with the American Society for Testing Materials' standards, in detail and in editorial arrangement. Each method has been subdivided into the standard order of sections, in the same general fashion that the A.S.T.M. employs for the same purpose.

The section on viscosity has been expanded considerably. Viscosity index tables and tables for converting kinematic to Redwood viscosities also have been included. A number of new methods have been added, and a new standard method for designating test methods has been adopted. Some of these new methods are: Diesel Index; Diluent Content of Crankcase Oil; Flash Point by Cleveland Cup; Oxidation Test for Lubricating Oils; Sulphur by the Quartz Tube Method; and Water and Sediment by means of Centrifuge.

Natural Gas

Southern California's Butadiene Plant Staffed

LOS ANGELES, Calif.—Reconstruction of certain facilities at Southern California Gas Co.'s plant here for the manufacture of butadiene is nearing completion. Major executive positions in the new butadiene operation have been assigned to H. L. Masser, executive vice president of Southern California.

J. G. Rollow continues as supervising engineer. He is assigned responsibility of formulating and reviewing general plans and policies, handling major technical operating problems, maintaining major contacts with governmental agencies and outside companies and with procurement of feed stock. W. W. Gaulka is acting assistant to Mr. Rollow and will supervise dispatching of feed stock and pipe-line operations.

Guy Corfield, as research engineer, is responsible for handling technical and chemical-control problems and research work.

Grove Lawrence, manager of manufacture, compression and storage, is responsible for operation and maintenance of the gas manufacturing and compressor plants, including equipment and personnel. Reporting to Mr. Lawrence are M. J. Cereghino, superintendent of butadiene-gas production, who will be in charge of the gas generators; K. G. Steinbeck, superintendent of the absorption plant, who will have charge of the Jackson Street (Los Angeles) compressor plant, absorption plant and the dehydration plant; and C. W. Beck, superintendent of the compressor plants, boiler plants and repair crews.

Management Conference To Cover Broad Subjects

CINCINNATI, Ohio.—The natural-gas management conference here April 29, this year's alternate for the annual meeting of the Natural Gas Section, American Gas Association, will precipitate discussions of the most momentous war and postwar problems facing the industry.

B. R. Bay, president of the Northern Natural Gas Co., Omaha, Neb., and chairman of the A.G.A.'s Natural Gas Section, will preside at the 1-day meeting and will discuss problems of the industry under wartime conditions. The tentative program follows:

Morning Session

Presiding, B. R. Bay, chairman, Natural Gas Section, and president, Northern Natural Gas Co., Omaha, Neb.

Opening remarks: A. F. Bridge, president, A.G.A., and vice president, Southern Counties Gas Co., Los Angeles, Calif. Alexander Forward, managing director, A.G.A.

Problems of the Natural Gas Industry Under War Conditions, Mr. Bay.

Manpower in the Natural Gas Industry, Frederick H. Harbison, labor counsellor, PAW.

The Relationship of PAW to the Natural Gas Industry, E. Holley Poe, director of the Natural Gas and Natural Gasoline Division, PAW, Washington, D. C.

The Relationship of WPB to the Natural Gas Industry, J. A. Krug, director of the Office of War Utilities, WPB, Washington, D. C.

Production, L. T. Potter, chairman production committee, Natural Gas Section, and chief production engineer, Lone Star Gas Co., Dallas, Tex.

Transmission, R. H. Ulrich, chairman, transmission committee, Natural Gas Section, and vice president, Southern Natural Gas Co., Birmingham, Ala.

Distribution, to be announced.

Business meeting: Presiding, R. E. Wertz, vice chairman, Natural Gas Section, and president, Amarillo Gas Co., Amarillo, Tex.

Afternoon Session

Resume of A.G.A.'s War Activities, Ernest R. Acker, chairman, War activities committee, and president, Central Hudson Gas & Electric Corp., Poughkeepsie, N. Y.

The Natural Gas Act After 4 Years, Marshall Newcomb, assistant general attorney, Lone Star Gas Co., Dallas, Tex.

Observations on Developments in the Natural Gas Industry During the War and Postwar Periods, Paul B. Coffman, vice president, Standard & Poor's Corp., New York, N. Y.

The Future of Natural Gas and Its Derivatives, K. S. Adams, president, Phillips Petroleum Co., Bartlesville, Okla.

Robinson Explains Supply Position of East Ohio Gas

CLEVELAND, Ohio.—French Robinson, president of the East Ohio Gas Co., appearing before the Ohio Utilities Commission last week stated the company would have available approximately 285,000,000 cu. ft. for a peak day next winter. The volume representing a deficiency of from 40,000,000 to 60,000,000 cu. ft. To meet this situation East Ohio has contracted with Panhandle Eastern for 50,000,000 cu. ft. daily with the privilege of taking up to 100,000,000 cu. ft. per day when available. Any surplus over daily needs will be stored underground in Stark and Summit counties for use on peak days. Other gas when available will also be stored in this area and used in the company's liquefaction plant.

Cleveland May Take Rate Case to Supreme Court

CLEVELAND, Ohio.—Spencer Reeder, assistant Cleveland law director, indicated last week that if the Utilities Commission sustains East Ohio Gas Co. appeals from the Cleveland gas-rate ordinances the city would carry the case to the U. S. Supreme Court.

Mr. Reeder sought to introduce at a commission hearing records of an appeal taken by the Hope Natural Gas Co. of West Virginia, supplying about 80 per cent of East Ohio's gas, from a Federal Power Commission rate-reduction order.

Natural Gasoline

Isobutane-Recovery Project

Installation of isobutane-recovery facilities at Cabot Carbon Co.'s Walton plant at Kermit, Tex., will be under the supervision of S. H. Cruncleton, who is in charge of operations at that unit. J. F. Moore, identified in the April 1 issue of the Journal as superintendent of the Walton plant is, instead, in charge of the Cabot company's Estes plant at Wickett, Tex. F. M. Neely is general superintendent of the gasoline department.

Frances Estes, first woman to work on the research staff of the Institute of Gas Technology of Illinois Institute of Technology, makes a volumetric analysis of gases in the Gas Institute laboratories. Miss Estes, who invades a field formerly reserved for men, works alongside 25 men who are also on the Gas Institute staff

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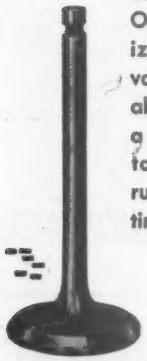
NOW when new products are so scarce, oil operators truly appreciate the quality and long life of Thompson products. Over 20 years' specialization in heavy duty valves and seats has enabled Thompson to make a worthwhile contribution to keeping equipment running during these war times.



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REFINING

Aviation-Fuel Plants In District 4 Progress

DENVER, Colo.—The program for the production of 100-octane aviation gasoline in District 4 is now under way and is being rushed as rapidly as possible. Catalytic-cracking units and other additions are being constructed by the Frontier Refining Co. at Cheyenne, Wyo., Sinclair Refining Co. at Sinclair (Parco), and the Utah Oil Refining Co. at Salt Lake City.

In connection with the aviation-gasoline program the Standard Oil Co. (Indiana) is enlarging its natural-gasoline plant in the Salt Creek field, and the Continental Oil Co. is doing the same at its Lance Creek plant.

Other refineries in the district will contribute to the program by furnishing gas oil and butylene fractions, including Bay Petroleum Corp., and Perry Petroleum Corp., in Colorado, and several small independents in Wyoming. In addition to these developments, several plants have been converted for the making of codimer and these are now in production, shipping their output to other districts, especially California, for hydrogenation. These shipments will continue after the new installations here are in operation with one exception in which hydrogenation equipment is being built.

The total estimated cost of these extensions and conversions is in excess of $18,000,000. These developments are exclusive of any plans of Standard Oil Co. (Indiana) to build a unit at Casper and connect it by pipe line with the Big Horn basin oil fields, a project which, as far is is publicly known, is in the rumor stage.

Midland Cooperative Closes Cushing Purchase

CUSHING, Okla.—Option to purchase Cushing Refining & Gasoline Co. has been exercised by Midland Cooperative Wholesale of Minneapolis, Minn., a deal that is understood to have involved about $1,000,000. Midland Cooperative handles supplies for 250 separate cooperative local distribution points in Minnesota and Wisconsin.

The Cushing refinery which has crude-oil capacity of 5,000 bbl. daily and a cracking unit of 2,500 bbl. per day is expected to supply about 40 per cent of the motor-fuel requirements of the Midland Cooperative outlets, all of the kerosene and approximately 50 per cent of the distillate-fuel demand.

Rex H. Winget, vice president and general manager of Cushing plant, continues with the Cushing refining division of the Midland Cooperative as manager and all members of his staff have been retained.

Other assets of the Cushing plant include storage facilities for 600,000 bbl. of crude and products, 110 tank cars, 100 miles of gathering lines and a working interest in a products line which connects its refinery and several other Mid-Continent processing units with the Great Lakes Pipe Line Co. system delivering products to the Minneapolis area.

Canton Plant Operating, Only Cracking Unit Idle

Canton Refining Co.'s 10,000-bbl plant at Canton, Ohio, is in operation, contrary to information published in the Journal's annual refinery survey in the issue of March 25. The company's 2,000-bbl. cracking plant is now idle. Inactivity of the cracking unit was misinterpreted to mean that the entire refinery was shut down.

Atlantic Tries Colloidal Fuel in Refinery Boiler

WASHINGTON, D. C.—Exhaustive tests to develop a fuel composed of a mixture of oil and coal, for years the goal of research chemists and engineers, have been started by the U. S. Bureau of Mines and Atlantic Refining Co. in an industrial boiler of the company at its Philadelphia refinery.

Under the agreement by which the tests are being conducted, the Government has supplied the necessary powdered coal and oil and the company has contributed the use of its facilities and research department. The data obtained will be assembled by the Bureau of Mines.

The tests are being supervised in behalf of the Bureau of Mines by Dr. W. C. Schroeder, assistant chief of the Fuels and Explosives Service. Dr. Arthus B. Horsberger is directing the company's technical experiment.

Cycloversion

A catalytic cracking process which makes a remarkable aviation gasoline blending stock from thermally cracked gasoline.

It can process gas oil to make a motor gasoline to meet the high octane requirements of the trade when the war is over.

Simple and comparatively low in cost, it is the answer to your catalytic cracking requirements.

Hydrofluoric Acid Alkylation

This process alkylates propylene, butylene and amylene with remarkable facility and low acid consumption. The commercial record of this process is outstanding.

These processes were developed and are licensed by THE PHILLIPS PETROLEUM COMPANY. As sales agents and engineers for these processes, we will be pleased to study their application in your refinery.

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PIPE LINE
CONSTRUCTION
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Pipe Line Equipment and Materials
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PIPE LINES

WEP Increases Rate of Laying Extension

With improved conditions coming with better weather War Emergency Pipelines, Inc., has been able to lay pipe for the eastern extension of the Texas-East Coast crude-oil line at a faster rate. On Sunday, April 18, 9.3 miles of pipe were laid; the day before in spite of rain 7 miles were laid. At the beginning of this week a total of 352 miles were welded between Norris City, Ill., and the East Coast, consisting of 292 miles of 24-in. and 60 miles of 20-in.

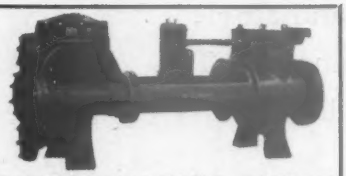
Already more than 60 miles of 20-in. pipe have been delivered at scattered points between Beaumont, Tex., and Little Rock, Ark., preparatory for the laying of the Gulf Coast-East Coast products line. Contractors organizations are moving in with equipment; clearing of right-of-way is progressing. Most of the route to Little Rock has been surveyed.

The work of the three gangs of Williams Brothers Corp. on the 20-in. products line will be directed from a Little Rock office by H. L. (Red) Davis; his spread men will be Jack Poston, G. E. Burton and Thelma Davis.

The line will require 280,000 tons of new steel. Eighty-four electric motors will turn up a total of 105,000 hp. to drive the 84 pumps required to move the 1,390-mile continuous column of petroleum from Texas to New York and an additional East Coast terminus, not yet definitely determined.

An article appearing elsewhere in this issue discusses the increased throughput of the WEP 24-in. line and some operation problems.

For a period extending through April 18 to 11 a.m. April 19, the WEP Longview, Tex.-Norris City, Ill., 24-in. line was shut down while changes were made in the installment of valves and fittings so as to eliminate



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Valve Plate as illustrated 3", 4", 6", 10", 12", 16" strokes Boiler Feed or Miscellaneous Service For 250 p.s.i. working pressure.
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Horizontal and Vertical Forged Steel, Cast Steel
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ADVERTISING
IN THE JOURNAL

Reaches 96.38% of the Refinery capacity of the 412 Operating Plants in the United States.

PIPE-LINE PERSONALITIES

HARRY "MIKE" NELSON, general superintendent, Empire Pipeline Co., admits that off the job he is a "wood pecker" member in good standing of that group of Bartlesville, Okla., business men that turns to wood working in home workshops for relaxation. Evidence of his early wood pecking may be found if sheathing be removed from the original logs of the house on the Bennington, Kans., farm where he was born.

Civil engineering studies were prominent in his schedule at Kansas State College. Vacations were occupied with applying what he had learned on practical jobs with Empire Gas & Fuel Co., predecessor to Cities Service Oil Co.; the Wabash railroad and the Bell telephone organization. After graduating from Kansas State in 1923 with a bachelor of science degree in civil engineering, Mr. Nelson was employed in the civil engineering department of Empire Gas & Fuel Co. Some years later he became resident engineer at Oil Hill, Kans., shortly before his assignment as resident engineer on the 250-mile 20-in. natural-gas line from Pampa, Tex., to Wichita, Kans.

In October 1937, he was transferred to Empire Pipeline Co. for special engineering work. The following year he was placed in charge of movements of natural gasoline mixed with crude. In 1942, he was promoted to the position of general superintendent of Empire Pipeline Co.

Mr. Nelson is married and has a 17-year-old daughter.

the possibility of contamination when crude oil and heating oil may be batched through the line.

WEP Blasts Trench for Susquehanna Crossing

Construction men on the 850-mile Illinois-to-East Coast extension of the WEP 24-in. crude-oil line blasted a 450-ft. trench across the Susquehanna River.

Paul C. Woodbridge, representative of the PAW, said explosives experts spent 3 weeks preparing for the blast which left a ditch 5 ft. wide in the river. He estimated that 30 tons of explosives would be required to blast across the 2,000-ft. wide river.

PAW Studies Proposal For West Texas Line

The proposal of Stanolind Pipe Line Co. for the construction of a 16-in. crude-oil line from the Slaughter pool, West Texas, to Drumright, Okla., is being studied by the staff of the petroleum administrator for war. Various aspects of the situation are being examined and consideration is being given to matters which will influence decisions as to whether steel for a project of this magnitude should be used for a line from West Texas to the Pacific Coast or for a line from West Texas to Oklahoma or for a line from West Texas to a junction with the WEP 24-in. Texas-East Coast crude-oil system.

Available information indicates that construction organizations may be in a position to put enough men on the West Texas project in September to justify an expectation that it would be practicable to plan on beginning it then if steel for the pipe has been authorized in the meantime.

State and City Officials Endorse Hugoton Line

Construction of the proposed pipe line to the Hugoton, Kans., gas field and relaxation of fuel production restrictions were recommended by Midwest governors and mayors meeting at Kansas City, Mo., last week to investigate the fuel situation, as important factors in solving the fuel shortage.

Those recommendations were made as the state and city executives conferred with the special Senate committee.

Gov. Andrew Schoeppel of Kansas urged the Government to be practical in making available to industry and domestic consumers the vast resources of the Hugoton field.

The Hugoton pipe line could be constructed in 90 days, according to Mayor John B. Gage of Kansas City, who attended the session with Mayors Richard O. Johnson of Lincoln, Neb., and Phil J. Welch of St. Joseph, Mo.

Early granting of permit for construction of the line from the Hugoton field to Wichita, Kans., was predicted at Kansas City by Sen. Bennett C. Clark, chairman of the special Senate committee investigating fuel conditions in the midwestern states.

Application was filed in Washington early this month with the War Production Board for the construction of the line by Cities Service Gas Co. which would build, own and operate the $14,000,000 proposed project.

It had been reported from Washington April 8 that the Office of War Utilities had the trans-Kansas line "definitely under consideration," but definite approval to the project is still awaited by Cities Service officials. At the same time it was reported that WPB had tentatively approved the use of 130,000 tons of steel for construction of natural-gas pipe lines to avert a threatened natural-gas crisis in the nation next winter.

In attendance at the Kansas City conference were representatives of federal agencies including War Production Board, the Office of Price Administration, the Office of the Petroleum Administration for War, the Federal Power Commission, and the Office of Defense Transportation.

Wisconsin Passes Law Impeding Pipe Lines

MADISON, Wis.—Gov. Walter S. Goodland has signed into law a bill passed by large majorities in both houses of the Wisconsin Legislature to impede the introduction of natural gas in the state.

The measure prohibits the sale of natural gas or "natural gas mixed with manufactured gas" in any Wisconsin city until a permit has been granted by the local government and a certificate of convenience and necessity by the state Public Service Commission.

Several legislators questioned the effectiveness of the new law in the light of a recent Interstate Commerce Commission ruling that natural gas is subject to federal regulation.

Eastern Lines Operate Close to Capacity

Volume of oil flowing through the trunk lines of the recently unified Indiana Pipe Line Co., Buckeye Pipe Line Co., Northern Pipe Line Co. and New York Transit Co. is close to capacity, P. R. Appelgate, president, said in the annual report. Large-capacity lines are being constructed in the territory served by the companies, and at present it is impossible to predict the effect of these on existing carriers, he stated.

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"The Modern Method"

An organization operating wherever Oil, Gas and Water Lines are constructed.

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Both steel and production time are critical. Save both by regular inspection of your machines. Look especially to your wire ropes that operate them. Wire rope is expendable. Take care of it in order to receive its full service. And this applies to all ropes including LAY-SET Preformed, for while LAY-SET outlasts ordinary non-preformed wire rope, it too will respond to proper care by lasting *still* longer. Here are a few suggestions:

- Clean and lubricate all ropes regularly. Be sure hemp core is not dry or corrosion or collapse may occur. Tighten fittings.
- Be sure you are using the proper rope for the service. Consult your Hazard representative. He will be glad to give you the benefit of Hazard's 97 years of experience.
- If sheaves or drums are critical diameter, specify Hazard LAY-SET Preformed because of its high fatigue-resisting quality.
- Be careful of the fleet angle. Don't let the rope deviate more than 1½° from center plane of sheave or excessive wear will result. (Note how this condition is beginning to start in this picture.)
- Don't allow bad spooling for crushing may result. Hazard LAY-SET Preformed spools much better than most ropes.

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HAZARD **LAY·SET** ROTARY LINES

Exploration and Drilling

Week's Highlights

THE fact that many oil sands produce only from 35 to 50 per cent of the oil which they are believed to contain has been the subject of much discussion. Many operators and engineers consider that the principal cause of this relatively poor recovery is the depletion of energy in the sand and that the only solution is the revitalizing of the pay by the injection of gas, air or water, that is, by secondary-recovery methods.

The frequent success of new wells drilled in what were considered to be depleted leases suggests that this is only a part of the story. Much of the failure to recover the greater part of the oil is due to accumulations which clog the pores of the pay near the well and prevent the flow of oil into it. This is particularly true in the case of heavy oil or of a crude in which there is much paraffin.

Recently experiments have been made on individual leases in Oklahoma wherein the application of high temperatures to wells have reportedly met with considerable success. Such experiments, in the opinion of many, are of interest but may not prove practical as the results may be of a temporary nature and may not repay the cost of installation of the equipment.

An article, appearing on page 88 of this issue is thus of particular interest in that it shows the results of the application of a moderate amount of heat in the Osage field in eastern Wyoming over a period of years. The author considers that production from the Muddy sand has been doubled as a result of the use of heat. The installation is not complicated and, as the author points out in an accompanying letter, the heating units are all of the home-made variety and "there never has been a petroleum engineer in the Osage field." In view of the facts outlined by the author, this last claim is one which may prove of short duration.

This week's report from the Rocky Mountain area (p. 102) also discloses some of the benefits of unit operation of oil fields. Salt Creek has always been considered an outstanding example of good engineering practice and there were few operators in the field so that competitive production practices did not prevail. Nevertheless, elimination of those few which did by unit operation of the field has cut the annual decline in this field to less than 50 per cent of the already low decline of 6 per cent.

Announcement of plans to spend $500,000 in improving the pilot plant now operating in the Athabaska tar sands (p. 111), shows the determination of the Canadian Government to aid in the oil development of that country. Also definitely in the news this week is the report by a major company that utilization of the oil shales of Colorado might begin with oil at a basic price of $1.50, or at practically the level recommended by Administrator Ickes (p. 48). These developments are, of course, long range but they suggest that there is a definite ceiling to oil prices which is far below those realized in the inflation following World War 1. Oil shales and the tar sands combined contain from four to seven times all of the oil found in oil reservoirs to date.

WEST TEXAS: A second well in Winkler County has found gas-distillate in the Ellenburger. It is 3½ miles from the discovery and may indicate a large producing structure (p. 98).

EAST TEXAS: Another Paluxy sand pool seems assured in Wood County. Quitman is extended 1 mile northeast (p. 101).

KENTUCKY: The new Robards pool in Henderson County is now one of the most active spots in the Eastern Interior Coal Basin (p. 93).

COMPLETIONS IN ALL FIELDS . . .

(Week ended April 17, 1943)

	Oil	Gas	Dry	Total	Footage	Total comp. to date 1943	1942
N. Y., Pa., and W. Va.	48	12	2	62	126,742	884	1,057
Ohio	3	7	5	15	29,150	205	277
Indiana	0	1	2	3	2,866	75	94
Kentucky	1	7	1	9	23,864	89	73
Illinois	15	0	7	22	57,248	513	465
Michigan	4	0	4	8	22,705	121	187
Kansas	15	0	12	27	87,923	390	426
Nebraska	0	0	0	0	0	7	16
Missouri, Iowa	0	0	0	0	0	4	6
Oklahoma	12	0	9	21	51,106	321	418
Texas:							
North Central Texas	9	0	12	21	55,779	339	401
West Texas	16	0	4	20	92,648	246	555
Texas Panhandle	1	2	0	3	9,469	52	149
Eastern Texas	3	0	0	3	17,556	70	137
Texas Gulf Coast	3	0	2	5	34,630	107	265
Southwest Texas	6	0	7	13	53,147	244	427
Total Texas	38	2	25	65	263,229	1,058	1,934
North Louisiana	0	1	3	4	22,918	80	160
Louisiana Gulf Coast	4	0	3	7	53,337	92	165
Total Louisiana	4	1	6	11	76,255	172	325
Arkansas	4	0	2	6	33,812	67	39
Mississippi and Southeast	0	0	0	0	0	23	20
Montana	2	1	0	3	8,884	46	41
Wyoming	0	0	1	1	6,230	34	26
Colorado, Utah	0	0	0	0	0	5	4
New Mexico	3	1	0	4	12,945	63	73
California	26	3	4	33	107,388	321	255
Total United States	175	35	80	290	910,347	4,398	5,736
Total previous week	190	31	137	358			
Week ended April 18, 1942	193	36	96	325			

Application of Heat Increases Production in Wyoming Field

by Frank V. Eaton

THE application of electric heat to the producing sand in the Osage field, Weston County, Wyoming, was initiated in 1930 by one operator, but the practice was not commonly used until 1935.

Osage was opened in 1920 and defined in the next 10 years and largely drilled out. Only one extension has been made in the past 10 years. As a result of electric heating the average production per well per day has held even for 7 years; whereas it might reasonably have been cut in half, considering the sand conditions.

A small percentage of the field's wells produce from shale, but the bulk of the oil has been obtained from wells in the Muddy sand, found at depths from 200 ft. to 3,200 ft. This formation drops in a long monocline from its outcrop 2 miles northeast of the defined field to its southwestern edge, 8 miles away.

The average sand thickness is about 10 ft. The average porosity is 20 per cent. The average bottom-hole temperature is 55°. The elevation above sea level drops from 4,000 ft. to 1,600 ft. Successful heating has been accomplished all over the field. The saturation is usually found in the top 5 ft. of the sand and diminishes lower in the formation.

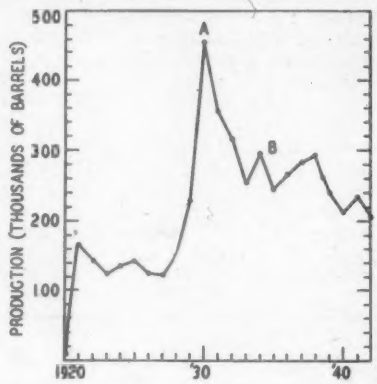

Fig. 1—Production record, Osage field. A—Heating started, B—Heating becomes general practice

No high gas pressures were found in developing the field, but there is a normal volume of entrained gas found in all wells. No efforts to conserve gas pressure were made in the earlier days of the field so paraffin plugging naturally ensued. Paraffin elimination is the primary purpose of the heating.

The practice is to hang a heating unit in the shot hole and run the current from a 25-kw. generator, belt driven by a 90-hp. motor, through a heavily insulated wire and back through the drilling line, suspending the heating unit. More efficient transmission of the current is accomplished by sending it down through the tubing, insulated by wood or bakelite blocks and back through the casing.

The operating time runs from 48 to 100 hours. The fluid level keeps the heating unit well covered at all times. The bottom-hole temperature is raised to from 200° to 300° F., ample to dissolve the plugging paraffin. There seems to be a limit to the heating on account of the counteraction of released gas and absorption into the oil in the hole and into the surrounding formation.

The well is put back on production promptly, so the dissolved paraffin is pumped out. It has been commonly noted that the wells respond to about 25 per cent of their initial flow. It has been found necessary to repeat the heating at regular intervals. Some operators have lengthened the intervals between heats. Others have found it well to heat as often as once a month. There is no agreement as to profits from either practice. It has been found feasible to set the perforations below the sand when frequent heating is the rule.

On one lease, this practice has resulted in a recovery of over 10,000 bbl. per acre from a sand body that would normally have yielded 5,000 bbl. per acre. The wells on this lease still average 20 bbl. per well per day after 12 years on production, and no early depletion is indicated. Similar results have been accomplished all over the field.

The Muddy sand is always found overlaid by bentonite and commonly broken by bentonitic or chalky shales. The operators try to case off the overlying bentonite and avoid the use of water in drilling in and cleaning as much as possible. The presence of connate water has been noted in wells on properties approaching de-

(Continued on Page 102)

DAILY AVERAGE PRODUCTION FOR WEEK

	Apr. 17 crude oil	April PAW quota all oils	Apr. 10 crude oil
Arkansas	71,600	78,600	71,200
California	787,250	823,700	780,000
Colorado	6,440	7,400	6,450
Eastern fields	92,200	114,300	97,800
Illinois	265,000	251,900	235,900
Indiana	15,950	16,000	15,950
Kansas	310,300	309,900	309,300
Louisiana	346,200	359,300	346,800
North Louisiana	*88,300*	.....	*88,900*
Louisiana Gulf Coast	*257,900*	.....	*257,900*
Michigan	61,500	63,700	60,800
Mississippi	56,700	50,000	55,000
Montana	20,400	24,600	21,570
Nebraska	2,200	2,600	2,250
New Mexico	105,480	105,700	105,490
Oklahoma	339,850	379,300	344,100
Texas	1,389,000	1,502,000	1,388,700
East Texas	*319,800*	.....	*319,800*
West Texas	*214,400*	.....	*214,250*
North Central Texas	*134,950*	.....	*134,950*
East Central Texas	*99,700*	.....	*99,700*
Texas Panhandle	*91,000*	.....	*91,000*
Texas Gulf Coast	*458,000*	.....	*457,850*
Southwest Texas	*71,150*	.....	*71,150*
Wyoming	96,200	97,100	92,500
Total United States	3,966,270	4,186,100	3,933,810
Total production Jan. 1-Apr. 17, 1943			416,125,170 bbl.
Same period last year			418,272,075 bbl.

TABLE 1

Annual Production Osage Field

1920	10,065	1932	317,165
1921	167,526	1933	253,417
1922	141,707	1934	295,484
1923	122,161	1935	345,416
1924	135,877	1936	268,112
1925	142,424	1937	281,251
1926	124,943	1938	294,852
1927	121,419	1939	239,950
1928	149,846	1940	213,300
1929	230,602	1941	234,280
1930	454,773	1942	204,305
1931	353,228		
			5,008,703

Do you want THIS to happen in America?

It is happening at this very hour in countries conquered by the Nazis and their satellites. Enforced labor in the field and in the factory is one of the lesser sufferings that come from Nazi kultur. Thousands in Greece and the Balkans are slowly starving to death, for the Nazis have stolen their food. Thousands in Norway suffer in below-zero temperatures, for the Nazis have stolen their clothing and their fuel.

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Western Kentucky Offers Opportunity for Prospecting

by Harry H. Nowlan*

THE Petroleum Administration for War has recommended the drilling of 4,500 wildcat tests during 1943. In 1942 there were 3,045 wildcat tests drilled. It is no easy task for the industry to find suitable areas within which to wildcat in order to approach the record of 1942. To increase that record in the face of low-priced oil will require all the ingenuity, aggressiveness and courage that the brains of the industry can put forth.

This article is a minor contribution toward the attainment of the request of the PAW. There appears to be room in Illinois, Indiana and Kentucky for a large number of wildcat plays and upon the completion of each wildcat test whether as a commercial producer or a dry hole, the information derived therefrom is of value in working out additional favorable wildcat plays.

The Illinois basin area, as a whole, seems to be at about the same relative position on a smaller scale as Oklahoma was in the early 1920's. The big pools, Cushing, Glen Pool, Bartlesville and many others, were on the decline. The price for oil was high and the outlook for new pools was not good but due to increasing knowledge of the subsurface formations there were numerous small Wilcox sand pools opened over a period of several years besides many other sand pools. All this caused an increase in wildcatting with subsequent increase in discoveries until along came Cromwell, Seminole, Oklahoma City and other large pools.

Today in the Illinois basin, Louden, Salem, Clay City, New Harmony Consolidated and other large pools are on the decline. The industry has today a great deal more information on the Illinois basin that it had 3 to 6 years ago. Day by day knowledge becomes greater as more wildcat tests are completed and as many small pools are being opened. Who knows for a certainty that no more Loudens, Salems, Clay Citys or New Harmony Consolidateds will be opened in the future?

A year ago western Kentucky was "washed up." In August 1942 the Smith Mills pool in Henderson County, Kentucky, was opened. To date 51 wells have been completed in the Cypress sand in this pool at a depth of 2,300 ft. with initial production as high as 1,200 bbl. per well per day. It is probable that the productive area will be over 1,000 acres. The producing sand is a blanket sand with a water drive over a structure with at least 30 ft. of closure. In fact an east-west reversal from 60 to 80 ft. is now known. The northeast and south-southeast sides are still not completely tested. No. 1 Farm Bureau-Delta Burbank well completed September 12, 1942, has produced in 6 months over 50,000 bbl. of oil and at present the daily production is 225 bbl. It is this fine little pool that has turned the attention of the industry to western Kentucky.

The area under discussion comprises about 2,500 sq. miles including

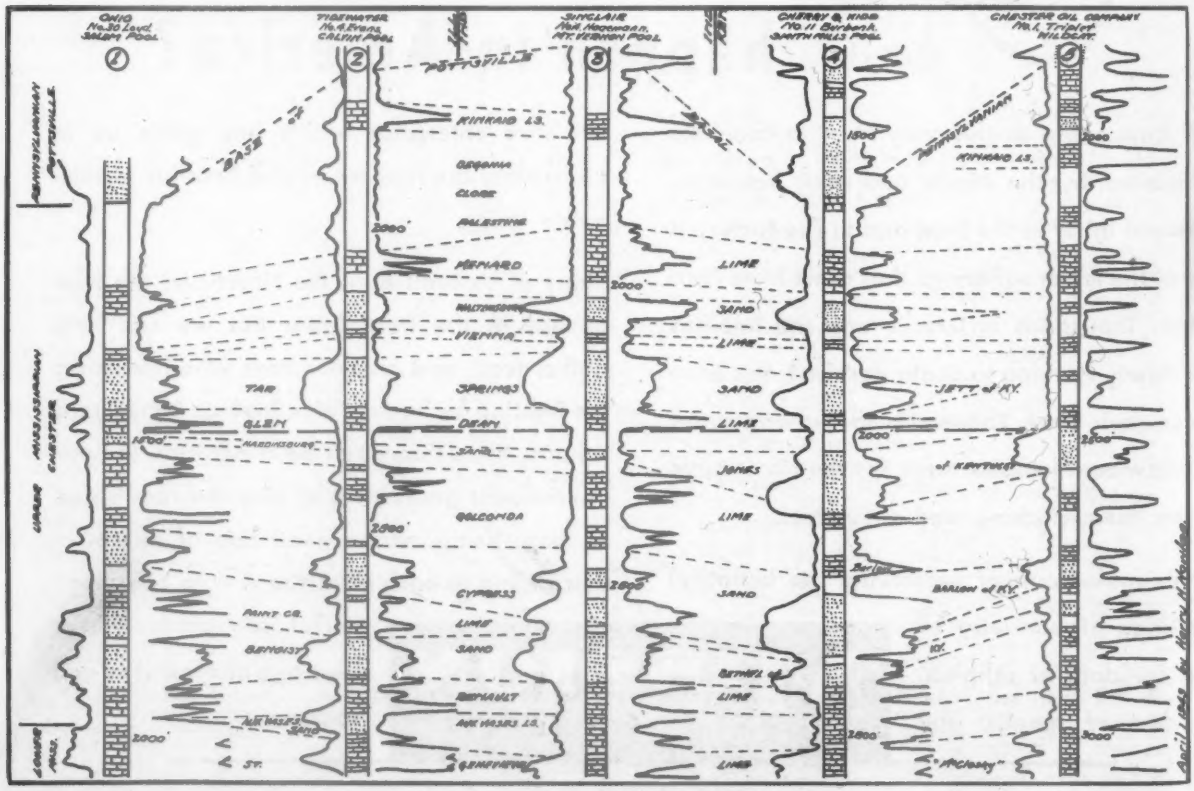
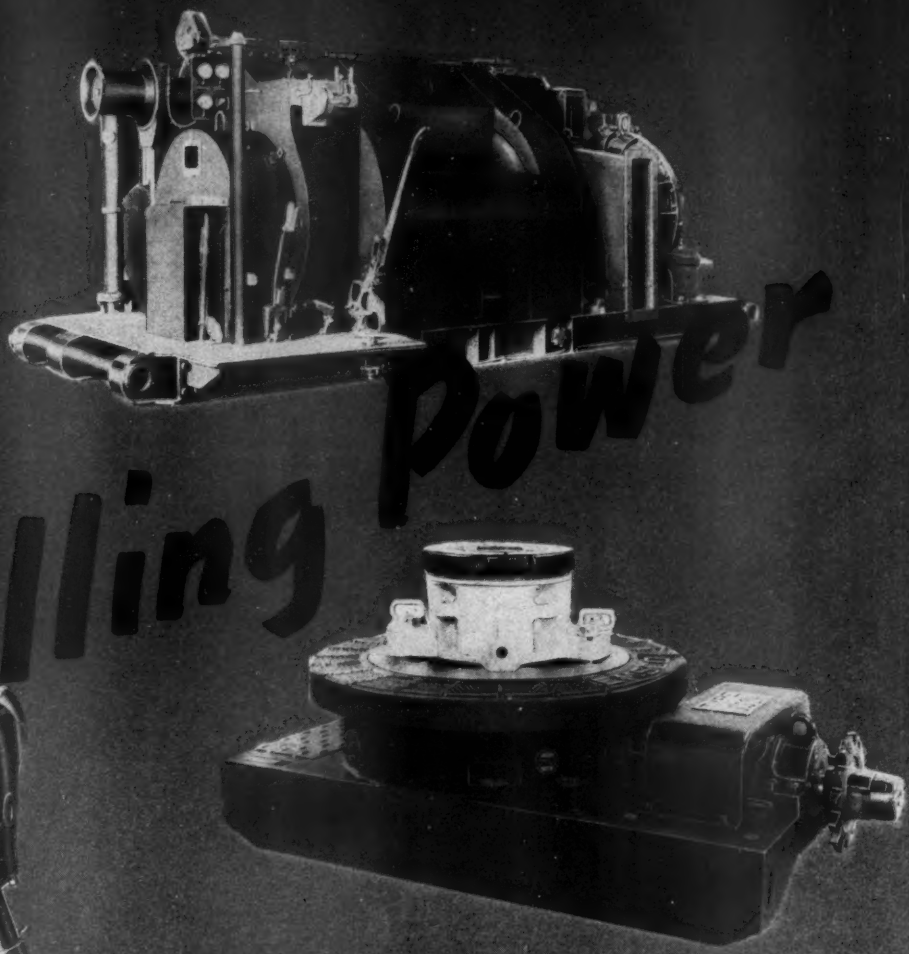


Fig. 1—Cross-section along line A-A on map



. . . the built-in ability to buck the twisting, bouncing drag of the bit . . . to withstand the shock and strain of constant "round trips" . . . to handle and operate efficiently and speedily under all conditions . . . to stand up, tour after tour, under the continuous beating of tough going . . . that's *drilling power.*

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the following counties: Union, Henderson, Daviess, Ohio, McLean, Muhlenberg, Hopkins and Webster. Regionally this is the southern portion of the Tri-State area which also includes portions of Southeast Illinois and Southwest Indiana, with the city of Evansville as its financial and industrial center. The Ohio River meanders through the center of the region.

The geographical and geological position of western Kentucky is illustrated in Fig. 2. Contours presenting a subsurface picture of the Illinois basin are based on the Glen Dean line. The bottom of the basin in both Illinois and Kentucky is probably minus 2,500, but the lowest contour in the Illinois portion of the basin is shown as minus 2,250 and in Webster and Hopkins County, Kentucky, it is minus 2,000 ft.

The production along the Wabash River is shown to be on an anticlinal nose in a graben (downthrown block). In Ohio County at Barrett Hill pool and in Webster County, Kentucky, at Sebree field, production is found in the fault zone on structural horsts (upthrown blocks). Production is found in other pools under ordinary structural conditions including numerous stratigraphic traps.

An important structural feature is the Rough Creek fault zone, which extends from Gallatin County, Illinois, near Shawneetown in a direction about S. 80° E. to a point about 50 miles east of the Ohio County, Kentucky, line. The strike of the majority of the faults in this zone is northwest-southeast and these are cut by transverse faults in northeast-southwest direction. The maximum throw of over 3,000 ft. is near Shawneetown, Ill., and to the east the throw drops to almost zero and again increases to several hundred feet from place to place. Much faulting may also be observed in southern Hopkins and Muhlenberg counties.

The five electric logs in Fig. 1 cover an area from the Salem pool in Marion County, Illinois, to the Smith Mills pool, in Henderson County, Kentucky, and beyond into Hopkins County to a dry hole about 15 miles south of the Rough Creek fault. These wells are located on the map as follows: No. (1) Salem; No. (2) Calvin; No. (3) Mount Vernon, Indiana; No. (4) Smith Mills, Kentucky; No. (5) dry hole in Hopkins County.

This section shows the various formations from the base of the Pottsville formation (base of Pennsylvanian) through the Chester (Upper Mississippian) into the Ste. Genevieve (Lower Mississippian). The logs are centered on the Glen Dean lime which is well developed over the entire basin. A rather persistent regularity of beds are shown to be present over the entire area. The base of the Pottsville lies unconformably on the eroded surface of the Chester. The various productive sands in the Kentucky and Illinois portions of the basin are as follows:

	Kentucky	Illinois
Pennsylvanian	Pottsville	Pottsville
Mississippiian (Chester)	Waltersburg	Waltersburg
	Jett	Tar Springs
	Jones	Hardinsburg
	Jackson	Golconda
	Barlow	Cypress
	Bethel	Benoist
	Aux Vases	Aux Vases

The most active area at present is north of the Rough Creek fault zone in Union, Henderson, western Daviess and the north portions of McLean and Webster counties. The Smith Mills and Robards pools in Henderson County and the Uniontown and Wathen pools in Union County are the most important developments during the past 8 months. As soon as the mud dries up many new tests are likely to be drilled in this area judging from the numerous drilling deals that are reported to have been made.

South of the Rough Creek fault zone, Webster, Hopkins, McLean and Muhlenberg counties will no doubt get a play in 1943. Considerable leasing is now being carried on in that area and a number of drilling committments have already been made. As a matter of fact, western Kentucky bids fair to be an extremely active area for the next 6 to 8 months and at least some showing should be made to take up some of the slack in reaching or helping to reach the 4,500 wildcat wells the PAW wants drilled in 1943.

Editor's note: Since the above article was written a new field has been brought in in Henderson County. See p. 93.

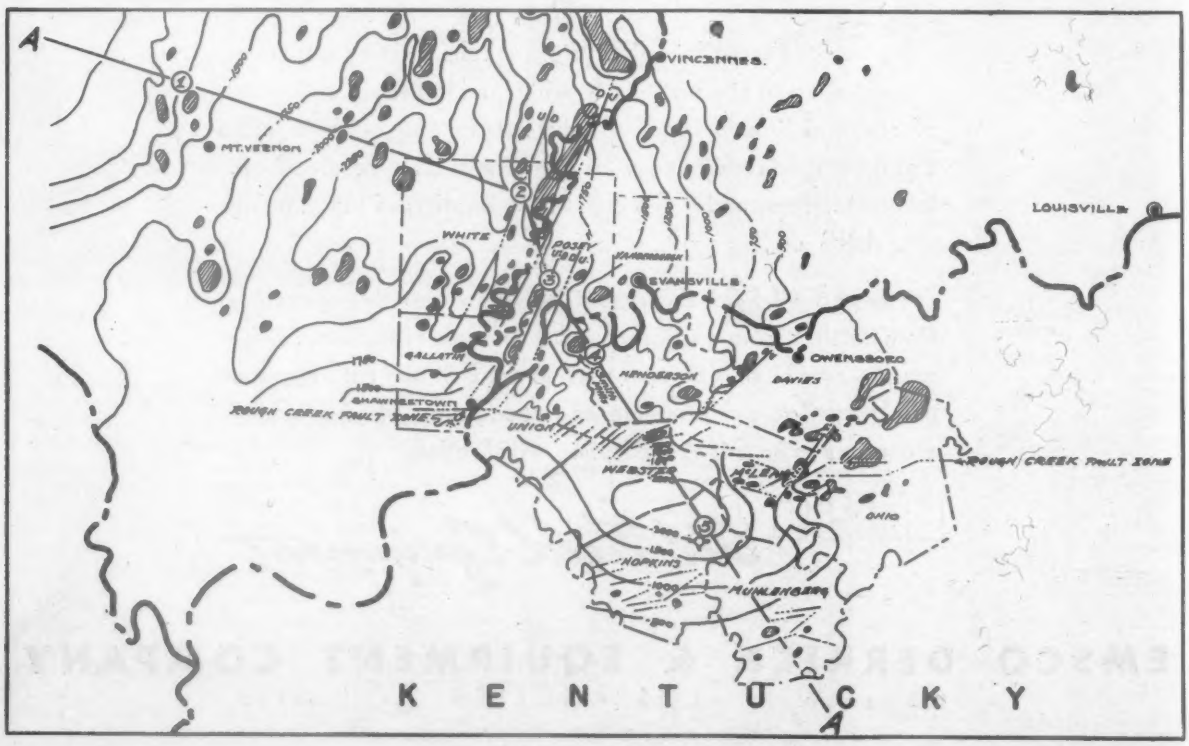

Fig. 2—Map of Tri-State area

New Large Field Being Developed in Henderson County

SEBREE, Ky., Apr. 15. — Oil excitement in western Kentucky, which has been growing steadily during the past 2 months as the Carter Oil Co. brought in a series of three producers in the southern portion of Henderson County, blazed to a new high here Sunday when Iley B. Browning brought in his Naomi Strum well in Henderson County, just north of the Webster County border. This well is the potentially biggest producer in this section to date. The Browning location is about 1½ miles north of Poole, Webster County, and is in the northern section of Mr. Browning's leased area, which includes about 6,000 acres in Webster and a small area just across the county line, extending into Henderson County.

Drilling was started on this well Sunday, April 4, using one of the new large rotaries. The Tar Springs sand was reached on the following Saturday morning when a drill-stem test showed that 1,000 ft. of oil had filled up in the hole in 1 hour. The total depth is 1,966 ft. and the core test at this depth showed fully saturated sand. Mr. Browning plans to move the rig to another location immediately and start operations on a second well.

Previous to this and extending over a period of years, Mr. Browning has been continuing his development in the southern end of the Webster County field, where to date he has brought in six producing wells, ranging from 50 to 400 bbl. per day initial production. The Strum well is good for 400 to 500 bbl. daily natural production and should make around 1,000 bbl. initial when completed.

First discovery of oil in the Henderson County field, which lies north of Webster, came when the Carter Oil Co. completed its test near Robards, bringing in a well on the Denton farm that produced about 100 bbl. a day, on the pump. Other tests in this area proved successful and the field now consists of five producers and three drilling wells.

News of the Browning discovery in the Henderson and Evansville papers brought in hundreds of oil men, lease and royalty buyers. Oil men and geologists calculate that the oil-bearing structure extends on to the south of the Strum lease.

EASTERN KENTUCKY

ASHLAND, Ky. — Drilling operations pointed upward this week with several new locations reported and data on a number of completions made available through a midmonth report. Nine gas wells were completed and one 12-bbl. oil well was listed in the report of eastern Kentucky activities.

One of the gas wells was a good producer, passing the million mark. Weather has slowed some road building, but the general trend is improved. One dry hole was recorded.

The completions are as follows:

Martin County: Virginian Gasoline & Oil Co. V-1321, A. L. Moore tract 2, Wolf Creek, T.D. 1,613 ft., 12 bbl. oil.

Rockcastle Gas Co. 1 Belle Fitzpatrick, Rockcastle Creek, T.D. 2,620 ft., shale, 620,000 cu. ft. gas.

Warfield Gas Co. 75 Allen Cassidy, Coldwater Creek, T.D. 2,762 ft., shale, 198,000 cu. ft. gas, O.W.D.D.

Floyd County: Kentucky-West Virginia Gas Co. 5275, Henderson Roberts, Little Mud Creek, T.D. 2,962 ft., in shale, 396,000 cu. ft. of gas, O.W.D.D.

Warfield Gas Co. 5140, Elk Horn Coal Co. Left Beaver, T.D. 2,665 ft., in shale, 372,000 cu. ft. gas.

Knott County: Warfield Gas Co. U-5153

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S. S. Cornette, Big Ranch, T.D. 2,822 ft., in shale, 391,000 cu. ft. gas.

Pike County: Warfield Gas Co. 5151 A. J. Akers, Island Creek, T.D. 1,951 ft., in Big Injun, 445,000 cu. ft. gas.

Columbian Fuel 891 Smith heirs, tract 14, Caney Branch of Mullins Fork, T.D. 2,965 ft., 207,000 cu. ft. gas. (shut in on casing with two strings of tools in hole.)

Columbian Fuel GW-1202, Ford Motor Co., tract 3, Dial Branch of Blackberry Creek, T.D. 2,864 ft., in Big lime, 379,000 cu. ft. gas.

United Carbon 1094, Colony Coal, tract 36, Road Fork of Robinson Creek, T.D. 3,201 ft., shale, 1,565,000 cu. ft. of gas.

Hamilton Co. H-6, Jeff Smith, tract 1, Coburn Branch of Pond Creek, T.D. 3,163 ft., dry.

OHIO

ZANESVILLE, Ohio.—The largest gas well drilled in the North Clinton field in a number of years was completed by the Ohio Fuel on the Larsen tract in Lot 9, Penfield Township, Lorain County. The well, a northeast extension of the Wellington pool, gaged 12,933,000 cu. ft. from the Clinton sand at 2,408-20 ft. All acreage in the Wellington pool is under lease to three operators, Glen Harman et al, H. C. Bishop, and Ohio Fuel, and each is running one or more strings of tools. Ohio Oil had drilled 26 ft. in the sand on their wildcat near Moxahala when it caught fire. After being extinguished, the well was shut in and the gas will be turned into the line until the volume is reduced, when it will be drilled deeper for oil. It is estimated now at 2,000,000 cu. ft. and 10 bbl. oil.

OHIO COMPLETIONS

Athens County, Carthage Township: C. W. Nuzum 4 J. R. Fish, Sec. 35, Cow Run, dry, T.D. 563 ft.

Rome Township: Ohio Fuel 2 F. G. Koehler, Sec. 33, Berea, dry, T.D. 1,723 ft.

York Township: Chartiers Oil 5 A. C. Stratton, Sec. 5, Clinton, dry, T.D. 3,625 ft.

Jefferson County, Saline Township: C. S. Kelly 3 Saltsman heirs, Sec. 35, Injun, 2 bbl., T.D. 1,025 ft.

Lorain County, Penfield Township: Ohio Fuel 1 N. W. Larson, Lot 9, Clinton, 12,933,000 cu. ft., T.D. 2,422 ft.

Medina County, Hinckley Township: Harry Dempsey 1 John Neiding, Lot 27, Clinton, dry, T.D. 3,331 ft.

Muskingum County, Perry Township: Wittmer Co. 1 C. D. Sparrowgrove, third quarter, Clinton, 94,000 cu. ft., T.D. 4,247 ft.

Meigs County, Salem Township: Downie et al 1 Francis Goff, Sec. 7, Keener, dry, T.D. 772 ft.

Morgan County, Marion Township: Bern O. & G. 20 C. I. Schofield, Sec. 2, Salt sand, 200,000 cu. ft., T.D. 902 ft.

York Township: Ohio Fuel 1 H. J. Spring, Sec. 36, Berea, 157,000 cu. ft., T.D. 1,073 ft.

Industrial Gas 1 Dell Rambo, Sec. 26, Berea, 94,000 cu. ft., T.D. 1,151 ft.

Noble County, Elk Township: Metcalf et al 15 C. H. Masters, Sec. 22, Germantown, 1 bbl., T.D. 1,042 ft.

R. L. Smithberger 22 W. G. Burkhart, Sec. 14, Germantown, 20,694 cu. ft., T.D. 1,340 ft.

Perry County, Reading Township: Pure Oil 3 Albert Wilson, Sec. 12, Clinton, 85 bbl., T.D. 3,223 ft.

Thorn Township: Palm Oil 1 H. S. Poulson, Sec. 14, Clinton, 1,500,000 cu. ft., T.D. 2,709 ft.

INDIANA

EVANSVILLE, Ind.—A small gas well and two dry holes comprised the results of the week's field work. Two wildcat locations were made in the state, Sun Oil Co. 1 Trimble, NW

March Completions Show Increase Over February

THERE was an increase in drilling activity during March with the result that completions stood at the best level of the year. More than one-fifth of the increase, or 39 wells were in California, where there is considerable redrilling of old heavy-oil fields. Oklahoma also showed a good increase with 32 more completions than in February.

Considering the depths drilled, the greatest increase came in the intermediate depth between 2,500 and 5,000 ft. That is, of course, governed largely by the location of the drillable spots but it appears also to be a reflection of current prices for crude. Operators have presumably come to the conclusion that they can afford to drill to this depth but not much deeper. On the other hand, still shallower pays are apparently pretty well drilled up. In March 1942, there were 73 wells completed at less than 1,000 ft., 602 between 1,000 and 2,500 ft., 271 between 5,000 and 10,000 ft. and 25 below 10,000 ft., showing a considerable decline in both shallow and deep drilling. The intermediate wells, have increased from 502 to 607.

SUMMARY OF OPERATIONS, MARCH 1943

	Comp.	Oil	Prod.	Gas	Dry	Under 1,000 ft.	1,000-2,500 ft.	2,500-5,000 ft.	5,000-10,000 ft.	Over 10,000 ft.	Footage	Drlg.
Appalachian*	210	139	257	59	12	1	172	29	8	0	428,267	271
Ohio	74	9	883	37	28	8	21	45	0	0	198,790	164
Indiana	19	10	828	0	9	1	11	7	0	0	40,750	25
Kentucky	29	3	19	23	3	0	14	15	0	0	72,120	135
Michigan	46	19	3,875	0	27	0	23	23	2	0	116,606	75
Illinois	135	88	10,551	1	46	5	50	80	0	0	341,857	152
Kansas	124	66	26,385	3	55	0	11	112	1	0	415,694	200
Nebraska	3	0	0	0	3	0	1	2	0	0	8,303	1
Missouri, Iowa	0	0	0	0	1	0	1	0	0	0	1,454	2
Oklahoma	113	51	6,666	14	48	3	27	68	15	0	382,470	192
North Texas	71	34	12,788	0	37	7	26	28	9	0	204,855	91
West Central Texas	30	6	1,902	2	22	6	10	14	0	0	66,854	57
West Texas	74	58	25,489	1	15	1	10	38	25	0	324,288	174
Texas Panhandle	14	11	1,321	1	3	0	0	14	0	0	37,012	36
East Texas	21	13	4,201	2	6	0	1	10	10	0	101,385	9
Upper Gulf Coast	25	14	3,501	1	10	0	0	4	19	2	170,469	68
Lower Gulf Coast	23	18	2,298	1	4	0	0	2	21	0	145,960	60
South Central Texas	4	0	0	0	4	0	2	1	1	0	11,001	14
South Texas	34	12	1,261	2	20	0	6	19	8	1	139,873	57
Southeast New Mexico	26	14	2,544	0	12	4	1	18	3	0	75,980	44
Arkansas	22	10	1,324	0	12	0	2	8	12	0	115,971	35
North Louisiana	22	10	709	1	11	0	4	10	8	0	90,551	42
Louisiana Gulf	25	15	3,636	0	10	0	0	1	12	12	228,873	79
Mississippi	10	1	76	0	9	0	0	1	9	0	68,806	12
Montana	14	9	926	3	2	2	7	5	0	0	30,953	67
Wyoming	3	1	720	0	2	0	1	1	1	0	12,081	62
Colorado, Utah	2	1	320	0	1	0	0	1	1	0	9,421	27
Northwest New Mexico	1	0	0	1	0	0	1	0	0	0	2,136	19
California	118	94	14,704	2	22	6	48	49	14	1	374,032	129
Florida	0	0	0	0	0	0	0	0	0	0	0	5
Alabama	0	0	0	0	0	0	0	0	0	0	0	2
Total March	1,292	706	127,204	154	434	44	450	607	179	16	4,216,812	2,306
Total February	1,110	638	110,592	123	349	34	461	455	144	16	3,550,553	2,217
Difference	182	68	16,612	31	85	10	11	152	35	0	666,259	89

*116 input wells in Appalachian area omitted from table.

SW SE 13-7s-12w, Posey County, and H. C. Deitrich 1 Duncan, SE NE SE 27-9n-6w, Clay County.

INDIANA COMPLETIONS

Spencer County: Charles Leeper et al 2 Kennedy, NW NE NW 34-6s-5w, dry at 1,240 ft., Benoist 940-60 ft., Renault 960-82 ft., Aux Vases 982-99 ft., Ste. Genevieve 1,000 ft., McClosky 1,120-26 ft.

Vanderburg County, Vienna pool: K. R. Bixby & Glaser, C S½ NW NW 31-5s-11w, 50,000 cu. ft. gas, R.P. 250 lb., Twp. ln, sand 468-94 ft.

Gibson County: Mo-Bu-Stro Oil 1 R. Dugan, SE SE NW 35-2s-9w, East Francisco, dry 1,132 ft. (hole full of water).

MICHIGAN

Aetna Pool Gets Another Large Producer

SAGINAW, Mich.—High promise of Missaukee County's Aetna Township oil pool continued last week with development of another heavy producer by Gulf Refining Co., which completed the 1 Buning in Section 35 at 3,827 ft. and obtained production of 487 bbl. in 21 hours after acidizing.

Field operations last week resulted in eight completions, four producing oil, including an inauspicious wildcat developed in Au Gres Township, Arenac County, by W. L. McClanahan. The test was completed for 17 bbl. a day after being drilled to 4,315 ft. and plugged back to 4,194 ft. Another 90-bbl. Kawkawlin field well in Bay County also was completed by Gulf and in Geneva Township, Van Buren County, Socony-Vacuum Oil Co., Inc., reported production of 192 bbl. a day from a well in Section 24. Three of the dry holes were wildcat tests.

The state Conservation Department issued six new drilling permits, two for Holland Township, Ottawa County tests, the others for locations in Osceola, Roscommon, Arenac and Van Buren.

MICHIGAN COMPLETIONS

Arenac County, Au Gres Township: W. L. McClanahan 1 Mulligan, C SE SE 17-19n-6e, wildcat, 17 bbl., acidized, T.D. 4,194 ft., P.B. from 4,315 ft.

Barry County, Rutland Township: Sun Oil Co. 1 Mead, C E½ NE SE 8-3n-9w, wildcat, dry, T.D. 2,354 ft.

Bay County, Kawkawlin Township: Gulf Refining Co. 1 Siegrist, C N½ NW NE 33-15n-4e, pumping 90 bbl., acidized, T.D. 2,943 ft.

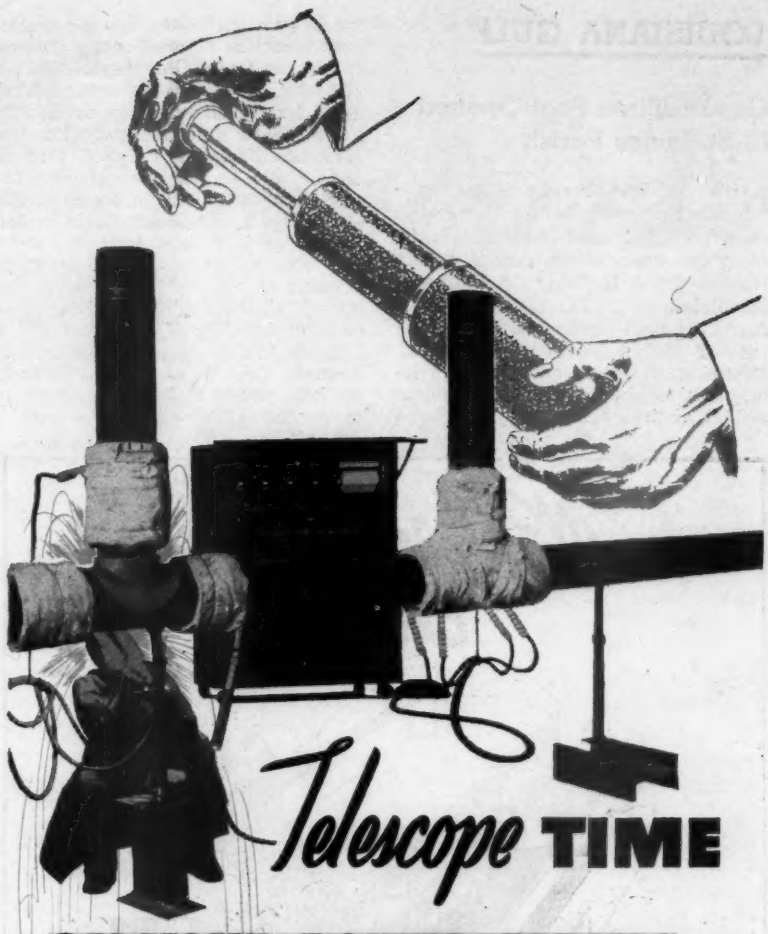
Missaukee County, Aetna Township: Gulf Refining Co. 1 Buning, C S½ NE NW 35-22n-6w, acidized for 487 bbl. first 21 hr., T.D. 3,827 ft.

Osceola County, Cedar Township: C. L. Maguire, Inc., A-1 State, C S½ NE NE 34-18n-9w, wildcat, dry, T.D. 3,908 ft.

Osceola Township: Sun Oil Co. 1 Weatherby-Gruber et al, communitized, C N½ SE SE 28-18n-8w, dry, T.D. 3,193 ft.

Van Buren County, Geneva Township: T. C. Hudson 1 Cross Est., SW NW NE 35-1s-16w, wildcat, dry, T.D. 1,088 ft.

Socony-Vacuum Oil Co., Inc., 1 Varnum, Marr & Hills, communitized, SW SE SW Sec. 24, pumping 192 bbl., natural, T.D. 1,077 ft.



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LOUISIANA GULF

Gas-Distillate Pool Opened In St. James Parish

NEW ORLEANS, La.—New production in St. James Parish has been recorded in 8-12s-16e, ¼ mile from the town of St. James, where Humble Oil & Refining Co. last week completed its 1 Panno & Bossetta, Inc. This pool opener flowed at the rate of 80 bbl. of distillate and 2,220,000 cu. ft. of gas daily through 3/16-in. positive choke. The one wildcat drilled in the parish last year was a failure. Another discovery for coastal Louisiana was marked up by General Crude Oil Co. in Beauregard Parish, 27-6s-9w, where the new Bear field, third for the parish, was opened by 1 C. S. Baldwin. Initial production was 151.2 bbl. of 43.6-gravity oil through ⅛-in. by 6-in. positive choke. The pay is at 6,512-20 ft. in the Frio. The old Roanoke and Welsh fields in Jefferson Davis Parish, long quiescent, may witness a renewal of activity as a result of a flank test to be drilled in each. Union Sulphur Co. has staked location for 1-A M. N. Stafford, in 2-9s-4w, on a 40-acre unit in the Roanoke field. It is planned to carry the hole to the Marginulina levels or deeper. In the Welsh field, where indifferent results have attended operations in the past several years, Stanolind Oil & Gas Co. will drill 1 W. L. Trimble, in 16-9s-5w. Projected depth is 9,500 ft. No new wildcat operations were reported in coastal Louisiana.

St. Landry Parish.—J. S. Abercrombie et al Alexander Charles Unit 2, 2 miles southwest of Leonville, resumed drilling after a season of mechanical trouble and was at 7,700 ft. in shale. It succeeded in cleaning junk out of the hole after losing drill pipe.

Acadia Parish.—Union Sulphur was preparing to test 2 Gueno, in the Branch area, after squeezing perforations, drilling out to 10,460 ft., and perforating liner at 10,453-57 ft. This well was drilled originally as a relief for 1 Gueno, which was out of control for months.

Plaquemines Parish. — Adding another to the list of failures recorded by the Bastian Bay field, Phillips Petroleum Co. abandoned its 4 Louisiana Land & Exploration Co. in 38-20s-29e. The hole was drilled to 10,080 ft. and plugged back to 7,572 ft.

LOUISIANA GULF COAST COMPLETIONS

Wildcats

Beauregard Parish: General Crude Oil Co. 1 C. S. Baldwin, 27-6s-9w, 151 bbl. through ⅛-in. by 6-in. positive choke, T.P. 1,200 lb., C.P. 1,750 lb., gas-oil ratio 834, perf. 6,512-20 ft., T.D. 9,412 ft., P.B. 6,575 ft., discovery name Bear field.

St. James Parish: Humble 1 Panno & Bossetta, Inc., 8-12s-16e, on 3-hr. gage flowed 80 bbl. distillate and 2,220,000 cu. ft. gas through 3/16-in. choke, T.P. 3,660 lb., gas-oil ratio 27,750, perf. 10,780-85 ft., T.D. 10,895 ft., P.B. 10,830 ft., discovery.

Fields

Bastian Bay, Plaquemines Parish: Phillips 4 L.L.&E., 38-20s-29e, dry at 10,080 ft., P.B. 7,572 ft.

Bully Camp, La Fourche Parish: Texas Gulf Sulphur Co. 1 Delta Securities Co., Inc., 1-19s-20e dry at 1,784 ft.

Iowa, Jefferson Davis Parish: Stanolind 1 E. S. Willett, 7-9s-6w, O.W.W.O., old P.B. T.D. 8,262 ft., new P.B. T.D. 8,216 ft., 211 bbl. through ⅛-in. choke, T.P. 1,475 lb., C.P. 1,575 lb., perf. 8,188-8,211 ft.

Pine Prairie, Evangeline Parish: Humble 3 Narcisse Ortego, 2-4s-1w, dry at 10,148 ft.

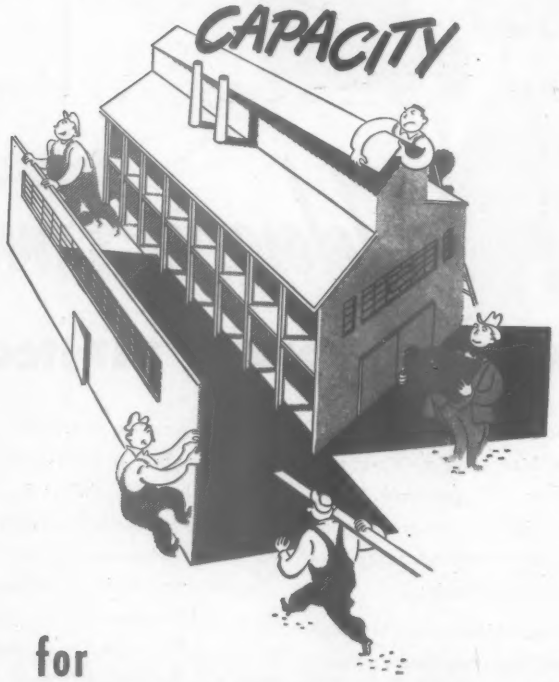
Gulf 5-A Schlicher-Thomas Co., 2-4s-1w, 292 bbl. through 5/32-in. choke, T.P. 975 lb., gas-oil ratio 815, perf. 7,665-74 ft. and 7,682-86 ft., T.D. 7,696 ft.

Port Barre, St. Landry Parish: Texas 29 Botney Bay Lumber Co., 4-6s-5e, O.W.W.O., old T.D. 6,028 ft., new P.B. T.D. 5,900 ft., 219 bbl through 10/64-in. choke, T.P. 1,090 lb., gas-oil ratio 875.

Ville Platte, Evangeline Parish: Continental 3 Ludeau-Haas, 44-3s-2e, O.W.W.O., old T.D. 9,073 ft., new P.B. T.D. 9,055 ft., 172 bbl., with salt water, through tubing choke, T.P. 150 lb., C.P. 1,000 lb., gas-oil ratio 1,445, perf. 9,040-55 ft.

Continental 1 Ortego-Guillory Unit 1, Well 2, 26-3s-2e, O.W.W.O., old T.D. 10,299 ft., new T.D. 10,240 ft., originally completed dry November 12, 1941; 190 bbl. through 9/64-in. choke, T.P. 1,100 lb., C.P. 2,550 lb., gas-oil ratio 780, perf. 10,210-30 ft.

Vinton, Calcasieu Parish: Union Oil Co. of California 7-G J. G. Gray estate, 33-10s-12w, 161 bbl. through ⅛-in. choke, T.P. 860 lb., perf. 5,265-85 ft., T.D. 5,830 ft., P.B. 5,290 ft.



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PERMIAN BASIN, PANHANDLE

Distillate Found in Ellenburger In Second Well in Winkler County

MIDLAND, Tex.—Magnolia Petroleum Co. 20 State-Walton, Section 4, Block B-3, Public School Land, 3½ miles west of Amon Carter's C-2 Walton distillate discovery, in Winkler County, topped Ellenburger at 10,460 ft., took drill-stem test from 10,456-69 ft., open 30 minutes, and recovered 450 ft. amber-colored distillate of 55.1° gravity. Another drill-stem test from 10,468-89 ft., open 15 minutes, recovered 150 ft. 54.7° gravity distillate and showed a spray estimated at 10 bbl. per hour. At last report the well was drilling ahead below 10,515 ft. On top of Ellenburger the Magnolia well ran 264 ft. lower than the Carter test, which had a minus datum of 6,262 ft., and opinions differ as to structural conditions. It is doubtful whether both wells are in the same structure, although this is possible due to steep dip characteristics of Ellenburger structures. The Carter C-2 Walton had drilled to 9,494 ft., and reamed hole to 9,490 ft. and was preparing to drill ahead from this depth with a smaller bit. Last drill-stem test from 9,470-94 ft., open 1 hour, showed 18.5 bbl. distillate per hour and average flow of 11,000,000 cu. ft. of gas. In the east part of the county, deepening was in progress at Shell 1 Blue, Section 15, Block 46, Township 1s, T.&P.R.R. Survey, operation of which was assumed by Stanolind Oil & Gas Co. The test had been shut down at total depth 9,437 ft. for some weeks, and present plans are to carry it to 11,000 ft.

Pecos County.—Magnolia Petroleum and Anderson-Prichard 1 State-Powell, Section 96, Block 10, H.&G.N. R.R. Survey, wildcat 1½ miles northeast of Apco-Warner Ellenburger production, indicated production from the Tubb pay, lower Permian horizon, when it blew out and flowed oil, starting at the rate of 500 bbl. per hour and declining to 50 bbl. per hour the first 5 hours, with sulfur water increasing to 90 per cent after 7 hours, and oil decreasing to 35 bbl. per hour. A crevice was found from 3,552-55 ft., where returns were lost, and casing dropped 190 ft., and when the casing was lifted 900 ft. the flow occurred. The flow was killed, but blew out again the following day, flowing an estimated 300 bbl. per hour, 50 per cent water. The water was believed to be coming from above the oil pay, and heavy mud was circulated to kill the flow and hole was being conditioned preparatory to casing off the water.

Crockett County.—Ellenburger was called at 7,654 ft. in Moore Brothers 1-16 J. S. Todd estate, which was drilling ahead below 7,850 ft. in dolomite. Shell 1 State, north outpost to the Noelke pool, had 47 ft. of Soma pay which was shaled up, topped at 1,383 ft., and was drilled ahead to 1,919 ft. where it is now fishing.

WEST TEXAS COMPLETIONS

Wildcat

Sterling County: Col-Tex Refining 1 Reed et al, NW NW Sec. 8, Blk. 30, W.&N.W. Sur., elev. 2,614 ft., Ellenburger 9,335 ft., dry, T.D. 9,587 ft., dolomite.

Fields

Abell, Pecos County: Skelly 1 G. T. Spears, 2,310 ft. from SE, 990 ft. from SW, Sec. 5, Blk. 3, H.&T.C.R.R. Sur., elev. 2,934 ft., flowed 72 bbl., pay 5,897 ft., "Waddell," perf. 71 shots, T.D. 5,907 ft.

Apco-Warner, Pecos County: General Crude 1 M. I. Masterson, 660 ft. from SW and SE Sec. 104, Blk. 10, H.&G.N.R.R. Sur., elev. 2,433 ft., flowed 1,061 bbl., pay 4,495 ft., perf. 225 shots 4,495-4,705 ft., T.D. 4,727 ft.

Clara Couch, Crockett County: Bay Petroleum 1 A. C. Hoover, SE SW Sec. 13, Blk. GG, elev. 2,430 ft., pumped 150 bbl., pay 1,897 ft., lime, acid 2,000 gal., T.D. 1,917 ft.

Embar, Andrews County: Phillips Petroleum 35 University-Andrews, NW SE Sec. 31, Blk. 10, University Sur., elev. 3,243 ft., flowed 218 bbl., pay 6,190 ft., T.D. 6,260 ft.

Keystone-Colby, Winkler County: Peck & Croft 1-C Seth Campbell, 440 ft. from S and E of NW¼ Sec. 28, Blk. B-3, Public School Lands, elev. 2,883 ft., lost hole, T.D. 3,069 ft.

Mascho, Andrews County: Magnolia 1-15 University, NE SE Sec. 15, Blk. 10, University Sur., elev. 3,219 ft., San An- 000 cu. ft. gas, pay 3,255 ft., perf. 3,044-3,220 ft., T.D. 3,465 ft.

McCamey, Upton County: Trebol Oil 4-C R. P. Ricker, 1,326 ft. from NE, 654 ft. from NW Sec. 6, R. C. Grooms Sur., pumped 136 bbl., pay 2,681 ft., perf. 2,691-95 ft., acid 1,000 gal., T.D. 2,696 ft.

North Cowden, Ector County: Stanolind Oil & Gas 1-4 Midland Farms, 440 ft. from S, 2,052 ft. from W Sec. 46, Blk. 42, G.&M.M.B.&A. Sur., elev. 2,044 ft., pumped 204 bbl., pay 4,590 ft., shot 330 qt., T.D. 4,701 ft.

Slaughter, Hockley County: E. Constantin et al 1 Elliott, 440 ft. from S and W Lab. 10, Lge. 42, Rains County School Land, elev. 3,583 ft., flowed 282 bbl., pay 4,912 ft., acid 6,000 gal., T.D. 4,948 ft.

L. M. Glasco 14-C Mallett, 580 ft. from S and E Lab. 14, Lge. 48, Edwards County School Land, elev. 3,608 ft., flowed 684 bbl., pay 4,897 ft., lime, acid 12,000 gal., T.D. 4,940 ft.

J. C. Hawkins 51-A Mallett, 580 ft. from S and W Lab. 13, Lge. 47, Edwards County School Land, flowed 320 bbl., pay 4,926-76 ft., lime, acid 11,500 gal., T.D. 4,976 ft.

T. F. Morrow 20 Mallett, 580 ft. from N and W Lab. 19, Lge. 48, Edwards County School Land. elev. 4,612 ft., flowed 469 bbl., pay 4,901 ft., acid 12,000 gal., T.D. 4,943 ft.

T. F. Morrow 24 Mallett, 580 ft. from N and W Lab. 18, Lge. 48, Edwards County School Land, flowed 728 bbl., pay 4,900 ft., acid 12,000 gal., T.D. 4,950 ft.

T. F. Morrow 34 Mallett, 580 ft. from S and E Lab. 11, Lge. 48, Edwards County School Land, flowed 642 bbl., pay 4,900 ft., acid 12,000 gal., T.D. 4,940 ft.

Trinity Drlg. 1 Dorothy Slaughter, 580 ft. from N and W Lab. 18, Lge. 35, Zavalla County School Land, flowed 480 bbl., pay 4,994 ft., acid 12,000 gal., T.D. 5,035 ft.

Taylor-Link, Pecos County: J. L. Cooper 3 University-Humble, 2,050 ft. from S, 1,750 ft. from E Sec. 13, Blk. 16, University Sur., flowed 74 bbl., 4 per cent water, pay 2,107 ft., shot 160 qt., T.D. 2,121 ft.

Milton Unger 1-C University, SW NW Sec. 34, Blk. 16, University Sur., dry, T.D. 1,756 ft.

Wasson, Gaines County: Bay Petroleum 1 Humble-Wasson, 1,980 ft. from N, 2,130 ft. from W Sec. 53, Blk. AX, Public School Lands, elev. 3,567 ft., flowed 420 bbl., pay 4,915 ft., acid 4,000 gal., T.D. 4,960 ft.

World, Crockett County: Trebol Oil 4 Powell, NE NE SW Sec. 53, Blk. BB, E.L.&R.R. Sur., elev. 2,701 ft., pumped 105 bbl., 11 per cent water, pay 2,482 ft., acid 1,500 gal., T.D. 2,588 ft.

SOUTHEAST NEW MEXICO

HOBBS, N. M.—After results of perforations from 9,110-80 ft. in Ellenburger zone were disappointing in R. Olsen and Atlantic Refining Co. 1 Langlie, plans were being made to reperforate from 9,110-60 ft. after previous perforations had been squeezed off, and the zone then was to be acidized.

SOUTHEAST NEW MEXICO COMPLETIONS

Fields

Eaves, Lea County: Continental Oil 1-B-31 Eaves, NW NE 31-26s-37e, flow 75 bbl., gas lift, pay 3,140 ft., T.D. 3,248 ft.

Jackson-Grayburg, Eddy County: Grayburg Oil 8-B Burch, SE NW 23-17s-29e, flow 600 bbl., pay 2,868 ft., acid 5,000 gal., T.D. 2,904 ft.

Langlie, Lea County: Western Gas 1 Sam D. Wimberly, SE NW 23-25s-37e, 2,500,-gelo lime 5,650 ft., dry, P.B. to 4,605 ft. from T.D. 7,627 ft.

Rhodes, Lea County: Anderson-Prichard 1-A-28 State, SE NE 28-26s-37e, flow 126 bbl., pay 3,278 ft., shot 65 qt., T.D. 3,328 ft.

TEXAS PANHANDLE

AMARILLO, Tex.—Stanolind Oil & Gas Co. 1 G. A. Corbin, SE SE Section 275, Block B-4, H.&G.N.R.R. Survey, Armstrong County, was staked last week. The test is contracted to 7,000 ft.

PANHANDLE COMPLETIONS

Gray County: Phillips Pet. 1 Myrt, NW NW NE Sec. 64, Blk. B-2, elev. 3,077 ft., I.P. 229 bbl., pay 2,925 ft., perf. 2,937-40 ft., T.D. 3,000 ft.

Phillips Pet. 1 Step, Sec. 187, Blk. B-2, flow 8,670,000 cu. ft. gas, pay 2,810 ft., shot 390 qt., T.D. 2,895 ft.

Potter County: U. S. Bureau of Mines 4-A Bush, 1,950 ft. from N, 1,680 ft. from E Sec. 23, Blk. 6, B.S.&F. Sur., elev. 3,376 ft., flow 6,000,000 cu. ft. helium, pay 3,190-3,290 ft., T.D 3,574 ft.

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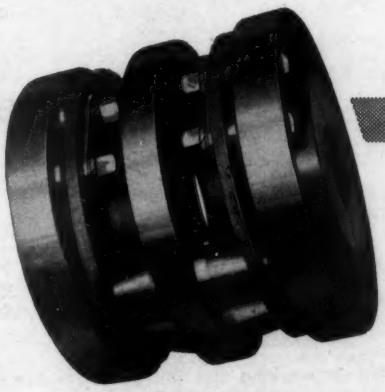

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N. CENTRAL TEXAS

Location Staked for Deep Montague County Test

WICHITA FALLS, Tex.—R. H. Dearing & Sons have announced location for their 1 H. D. Field, 660 ft. from northeast and northwest lines of Section 24, J. Field Survey, in northeast Montague County, 4 miles southeast of St. Jo, to go to 8,000 ft. This is the first test to go that deep in eastern Montague County. Wildcat to test the Ellenburger in western Cooke County is Akin & Dimock and Cochran & Cain 1 L. N. Ray, 990 ft. from northerly north line and easterly east line of the J. J. Coker Survey, 3 miles southwest of Bulcher. Grayson County also received a new wildcat location, Burk Royalty Co. 1 William Freeman, 330 ft. from north and west lines of 148-acre tract in the G. B. Reeves Survey. Corrected location for Continental Oil Co. 1 G. T. West is 4,922 ft. from north line, 330 ft. from east line of G. W. Scott Survey, 1½ miles west of Wichita Falls, Wichita County.

Young County.—British-American Oil Producing Co. 1 Roach, Section 304, T.E.&L. Survey, northwest part of county, cored from 5,026-32 ft. and recovered 2½ ft. of lime with good stains of oil, and on 30-minute drillstem test from 5,005-32 ft. got only drilling mud, and was drilling ahead.

NORTH TEXAS COMPLETIONS

Wildcats

Jack County: Joe A. Worsham 1-A H. J. Hensley estate, 920 ft. from N, 3,367 ft. from W, Thos. Martinez Sur. A-386, dry, S.S.O. 5,281-88 ft., T.D. 5,335 ft.

Wise County: Youngblood & Foree 1 J. S. Berry, 660 ft. S and E of J. P. Hash Sur. but in Edw. Stephens Sur. A-754, dry, T.D. 6,550 ft.

Fields

Archer County: L. T. Burns 1-A Turbeville, Lot 161, R. Carson Sur., elev. 1,086 ft., pump 10 bbl. pay 1,294 ft., T.D. 1,306 ft.

L. T. Burns 2-R Turbeville, 330 ft. from S and E Lot 160, R. Carson Sur., dry, T.D. 1,527 ft.

M. T. McLaughlin 1 J. T. Richardson (R. H. King tract), Lot 3, M.E.P.&P. Sur. A-715, dry, T.D. 1,253 ft.

J. S. Smith 4-B J. T. Longley, Sec. 1839, T.E.&L. Sur., pump 6 bbl., pay 930 ft., sand, T.D. 957 ft.

Cooke County: Burk Royalty 1 Allie Giles, 330 ft. S, 780 ft. E of B.B.B.&C. Sur. but in Wm. Moore Sur., dry, T.D. 2,540 ft.

Ellis, Jack County: Hanlon-Buchanan 1 T. C. Jones, 495 ft. from S, 467 ft. from W 101½-acre tract, J. W. Williams Sur. A-877, flow 213 bbl., pay 4,900 ft. lime, acid 3,000 gal., T.D. 4,913 ft.

Harrold, Wilbarger County: R. H. Dearing & Sons 1-B Rosa Cochrain, 1,460 ft. from N, 330 ft. from W, Sec. 47, Blk. 47, H.&T.C. Ry. Sur., dry, T.D. 3,451 ft.

K.M.A. Ellenburger, Wichita County: E-C Oil 9-E G. F. LeBus, 630 ft. from N, 710 ft. from E of S 100 acres, Wm. H. Spillers Sur. A-258, flow 338 bbl., pay 4,247 ft., dolomite, T.D. 4,260 ft.

Myers, Jack County: Elmore Oil 2-B G. F. Myers, Sec. 1, S.P.R.R. Co. Sur., pump 66 bbl., pay 2,345 ft. sand, T.D. 2,352 ft.

Rock Crossing, Wilbarger County: Phillips Pet. 225 W. T. Waggoner estate, 220 ft. from E, 440 ft. from S, NE NE Sec. 44, Blk. 4, H.&T.C. Ry. Sur., pump 15 bbl., pay sand 1,835 ft., shot 40 qt., T.D. 1,860 ft.

Thornberry, Clay County: J. C. Barnard 4 J. B. L. Hansard, Blk. 1, Thornberry subd., dry, T.D. 237 ft.

Sewell, Young County: E. W. Robitaille 6-A J. C. Vaughn, 1,329 ft. from S, 1,343 ft. from W, Sec. 1, B.B.B.&C. Sur., elev., 1,291 ft., old T.D. 4,070 ft., drilled deeper to 4,300 ft., P.B. to 4,250 ft., flow 15 bbl., pay 3,928-4,068 ft.

Walnut Bend, Cooke County: Sinclair Prairie Oil & Gas 10-B D. A. Cox, 85 ft. from E, 2,412 ft. from S, Blk. 60, Fannin County School Land, flow 605 bbl., perf. 5,397-5,444 ft., sand, T.D. 5,445 ft.

Sinclair Prairie Oil & Gas 11-B D. A. Cox, 2,412 ft. from S, 1,405 ft. from E, Blk. 60, Fannin County School Land, flow 1,210 bbl., perf. 5,382-5,420 ft., T.D. 5,518 ft.

WEST CENTRAL TEXAS

ABILENE, Tex.—J. D. Hancock 1 Black Brothers Ranch, Section 1144, T.E.&L. Survey, Stephens County wildcat, drilled to total depth 4,601 ft. in Ellenburger, set 7-in. casing at 4,020 ft., perforated with 60 shots opposite Marble Falls lime from 3,976-85 ft. and was flowing gas with mud. Operators were to wash with 500 gal. acid to clean out the formation, which was very soft and into which cement had penetrated. The gas was estimated at between 1,500,000 and 2,000,000 cu. ft., gradually increasing, and turning brown in color. In the Hill

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area of the old Eliasville pool, Texas Pacific Coal & Oil 13 S. H. Hill, Section 1122, T.E.&L., was credited with having a good show of oil in Caddo lime topped at 3,235 ft., with porosity from 3,254-76 ft., but was drilling ahead to the Mississippi lime found in the prolific 12 Hill producer.

WEST CENTRAL TEXAS COMPLETIONS
Wildcats

Crabb & McNeel 1 O. J. Knight, 1,950 ft. from W, 930 ft. from S, 364-ac. lease, George Eubanks Sur., Sec. 185, dry, T.D. 606 ft.

Taylor County: Hunter & Hunter 1 D. E. Bell, 660 ft. from N and E lines 220-ac. tract, W. W. Sills Sur., Sec. 23, elev. 1,749 ft., dry, T.D. 2,399 ft.

Bluff Creek, Shackelford County: Roeser & Pendleton and Humble 52 J. P. Morris, N½ NE SE Sec. 205, E.T.R.R. Sur., I.P. 73 bbl., pay 1,479-84 ft., T.D. 1,489 ft.

Scranton, Callahan County: L. A. Warren 2 Burl Clinton, M. Cherry Sur., dry, T.D. 560 ft.

Cook, NW extension, Shackelford County: Roeser & Pendleton 4-A W. I. Cook estate, NE SE Sec. 146, E.T.R.R. Sur., dry, T.D. 1,609 ft.

House, Palo Pinto County: Hickok & Reynolds-States Oil 1-C Joe D. Johnson, B. McNally Sur., dry, T.D. 2,809 ft.

EASTERN TEXAS

Prospective New Paluxy Sand in Wood County

DALLAS, Tex.—Bobby Manziel 1 W. F. Bailey, S. Burch Survey, 5 miles southeast of the Coke pool, offered more assurance of opening a new Paluxy sand pool when it swabbed light brown oil after perforating casing from 6,244-6,319 ft. with a total of 172 shots. Oil sand was logged on electrical survey from 6,261-74 ft., and casing was set at 6,356 ft. On the twenty-first pull of the swab, the line broke, and 2,000 ft. of it was lost in the hole, and operators are now fishing for swab. The Quitman pool was extended a mile northeast when Roger Lacy 1 Stone & Johnson, southwest corner of the Hazard Anderson Survey, was completed for a flow of 725 bbl. per day from Paluxy pay 6,302-47 ft. Delta Drilling Co. 2 Blalock, east offset to the discovery well, flowed at the rate of 768 bbl. per day, and Barnsdall Oil Co. 1 Kirkland, southwest extension, had drilled 8 ft. of pay sand in going to 6,286 ft., and was coring ahead. Amerada 1 Turner, Smackover test on east side of Coke pool, had reached 8,017 ft. with less than 100 ft. to go to finish contract.

Franklin County.—Tide Water and Seaboard 1 Bacon, Maximillian Survey, north of Scroggin, 8,100-ft. test, took additional cores from 7,990-8,026 ft., recovering sand showing oil, and from 8,026-28 ft. recovered very hard sandstone, and the last core from 8,037-42 ft. showed hard, gray shale. The hole is bottomed at 8,050 ft. in hard siltstone, preparing to core ahead.

Robertson County.—Magnolia 1 Anderson, Jacob Fisher Survey, showed 1,200 ft. salt water on drill-stem test of the Edwards lime zone from 4,832-45 ft., and was drilling ahead below 4,876 ft. Armstrong & Richardson 1 E. G. Marsh, Hugh Henry Survey, 6 miles south of Franklin, had good show of oil from 537-40 ft., and was setting pipe to test.

Smith County. — Outpost for the Chapel Hill pool is Sun 1 C. C. Finch, 1,000 ft. from north, 660 ft. from east lines of Harvey Hall Survey. It is on the northwest side of the pool. C. L. Wycliffe 1 Hackett, Samuel Leeper Survey, recovered 600 ft. of black oil, 23.5° gravity, on 15-minute drill-stem test from 7,281-7,307 ft., in Paluxy sand topped at 7,280 ft.

EAST TEXAS COMPLETIONS
Fields

Hawkins, Wood County: Humble Oil & Ref. 1-B Yates, George Brewer Sur., elev. 402 ft., flowed 462 bbl., ¼-in. choke, perf. 4,587-94 ft., T.D. 4,688 ft.

Quitman, Wood County: Roger Lacy 1 Stone & Johnson, 1,810 ft. from S, 467 ft. from W Hazard Anderson Sur., elev. 446 ft., flowed 725 bbl., pay 6,302-47 ft., T.D. 6,383 ft., extension.

Shell Oil 3 Dr. J. B. Goldsmith, 1,992 ft. from N, 1,747 ft. from W, W. W. Lanier Sur., elev. 441 ft., flowed 69 bbl., perf. 6,278-6,304 and 6,325-40 ft., T.D. 6,485 ft.

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ROCKY MOUNTAIN

Sundance Production Found Northwest of Pilot Butte

DENVER, Colo.—The discovery well of British-American Oil Producing Co. on the Steamboat Butte high, Fremont County, Wyoming, 2 miles northwest of the Pilot Butte field, began flowing after it had been swabbed and made 111 bbl. in 24 hours through the casing. On the swabbing test it averaged 27 bbl. an hour. It is now waiting for pumping equipment for additional testing. The location is 1-E Tribal, NE NW NW 5-3n-1w, total depth 5,119 ft. It had the top of the Sundance at 5,081 ft., and 7-in. was set at 5,091 ft. This is the first Sundance sand production found in that general area. It averages around 28 gravity. Location has been made for a second well in 1-C Tribal, NE cor. Lot 4, SW SW 32-4n-1w, an offset on the northwest to the discovery, and probably will be a test to the Tensleep, the original objective in the first well. Plans are being drawn for a 4-in. 3-mile pipe line from the field to the Pilot Butte loading racks. The latter are located on the main highway through the Indian reservation and from that point crude will be shipped by truck. It will be a gravity line, the elevation being 200 ft. higher at the well than at the destination.

North Lance Creek. — Another important wildcat is getting under way in the Superior Oil Co. 1-A Ong, C SE SW 31-36n-65w, on the northwest side of Lance Creek, which is moving in for a test to the Leo sands at around 8,800 ft. The objective is expected at approximately 3,500 ft. deeper than the Leo horizon is found in the wells to the east. Drilling in this area 3 years ago disclosed subsurface faulting. The Argo Oil Co. drilled a well only a few hundred feet away from this location in 1939 and abandoned it at 5,653 ft., the hole being bottomed in Cretaceous bentonitic shale after having gone through a section of red beds. A. B. Cobb & Co. then drilled a south offset with similar results, the two wells indicating they were located in an underthrust fault block.

Eastern Colorado.—A wildcat which has a direct bearing on the eastern Colorado situation spudded 3 weeks ago in Wallace County, Kansas, 3 miles from the town of Weskan, and only a few miles directly east from Cheyenne Wells, in Colorado. It is being drilled by Broderick & Gordon, of Denver, on a block held by the Stanolind Oil & Gas Co. It will explore all horizons down to the granite. The location will be given next week. Stanolind acquired a large block in 1936 in 13 and 14s-41 and 42w, on the eastern line of Cheyenne County and extending over into Kansas. The Colorado acreage was assembled by W. O. Rennie and the acreage in Kansas by George Deck for the Stanolind company. The block included some railroad acreage held by the Gulf Oil Corp.

Arizona.—The Zuni River structure, Apache County, Northeast Arizona, will be the first of three domes to be tested in that area by the Argo Oil Co. and the Saltmont Oil Co. Martin T. Rathvon, in charge of drilling operations for the Argo company, is in the field with the company's engineer making the location. The structure is due west from the producing fields in San Juan County, Northwest New Mexico. The Goodridge lime of the Pennsylvanian, which was topped at 5,600 ft. at Rattlesnake on the New Mexico side, is expected at a shallower drilling depth at Zuni River. The structure has a mapped closure of 300 ft.

Salt Creek. — Mountain Producers Corp., one of the larger lease holders in Salt Creek, reported a production in that field of 1,242,733 bbl. from the light-oil area in 1942 after deducting government and other royalties, which compares with 1,261,736 bbl. in 1941, a decline of 1.5 per cent. The decline in 1941 as compared with 1940 was 2.9 per cent. Before Salt Creek was unitized in 1939, production normally dropped around 6 per cent annually. The operation of the field as a single unit was expected to slow down the decline. The Mountain Producers figures are for net production from its own acreage. The gross production for the field as a whole since unitization is as follows:

	Production	Per cent decline
1939	5,336,240	...
1940	5,206,284	2.49
1941	5,086,040	2.36
1942	4,953,583	2.67

WYOMING COMPLETIONS

Pilot Butte, Fremont County: Superior Oil Co. 2 Annie Hoffman, E½ NW SW 22-3n-1w, T.D. 6,660 ft., dry in the Tensleep, top 6,230 ft.

MONTANA COMPLETIONS

Cut Bank, Glacier County: R. C. Tarrant 1 Hintz, NW SW 19-35n-5w, T.D. 2,841 ft., 7-in. 2,753 ft., Sunburst 2,740-83 ft., 500,000 cu. ft. gas at 2,775-83 ft., Cut Bank 2,791-2,840 ft., main pay 2,830-40 ft., gaged 3,000,000 cu. ft., open flow.

Trigood Oil Co. 4 Tribal-131 SE SW SW 30-32n-5w, T.D. 3,063 ft., 7-in. 3,005 ft., Cut Bank 3,000-53 ft., main pay 3,040-53 ft., swabbed 95 bbl., then shot.

Texas Co. 7 Bonnet, SE SW 8-32n-5w, T.D. 2,980 ft., 7-in. 2,940 ft., show oil in Sunburst 2,903-26 ft., Cut Bank 2,935-75 ft., main pay 2,965-75 ft., swabbed 90 bbl., then shot.

Application of Heat Increases Production

(Continued from Page 88)

pletion. Heating helps control the tendency of bentonite to swell and plug the sand. It has been found helpful to heat wells immediately after they are drilled in and cleaned out, to eliminate any water absorbed.

The temperatures attained in heating are in dispute. There is no standard distance above the heater to set the recording thermometer, and the readings vary widely with the volume of oil in the hole and the distance from the heater and the volume of gas being released.

Voltage required varies with the depth of the well being heated. Where 200 volts will do a thorough job in wells under 1,000 ft. in depth, it is customary to use 450 volts in wells over 2,000 ft.

D.C. generators have been found preferable for the work; the a.c. could do the job as well, except for its tendency to short. The close proximity of the conducting wire, tied for support to the drilling line, calls for careful guarding and inspection of the insulation.

It was customary to keep an attendant constantly watching the instruments until an automatic shutoff was devised to stop the motor whenever a short develops.

Costs connected with electric heating have been steadily lowered. Some work is contracted at $1 per hour, where the operator provides natural gas for fuel.

The heating units which have been successful have been built in local shops. The generators are standard commercial types. They are belt driven by a variety of motors, averaging 90 hp. They are mounted on a trailer, housed against the weather, with the instruments on a panel. Large cooling tanks are necessary for the motor's circulating water. Equipped with 2,000 ft. of No. 2 copper insulated wire, the unit cost runs close to $2,000.

The heaters have all been built in local shops by coiling No. 7 or No. 8 nichrome wire through porcelain insulators around a steel core. They are wound to run inside the casing easily. One type is enclosed in a thin steel case with perforations at the top and bottom to keep the oil circulating by the coil. It is customary to set a cleanout machine to pull the rods and tubing and to clean out the well before heating and after heating, if found necessary. The trailer-mounted heating unit is set close to the well and wires run to the well head.

Osage crude is of paraffin base and averages 40 gravity. The gravity is as high now as when the fluid was first put on production 23 years ago. The small investment involved in initiating heating on a producing property is warranted if it only accelerates the recovery of a normal yield of the oil in place to a point of depletion. Until recently the Osage operators have hesitated to claim anything but the usual recovery per acre, but are now realizing that they are recovering from 50 to 75 per cent of

the original oil content of the sand. No heated property has been depleted to abandonment.

The experiments have all been conducted without the benefit of outside advice and the knowledge of it rests with the rank and file of small operators and their pumpers and roustabouts.

APPALACHIAN FIELDS

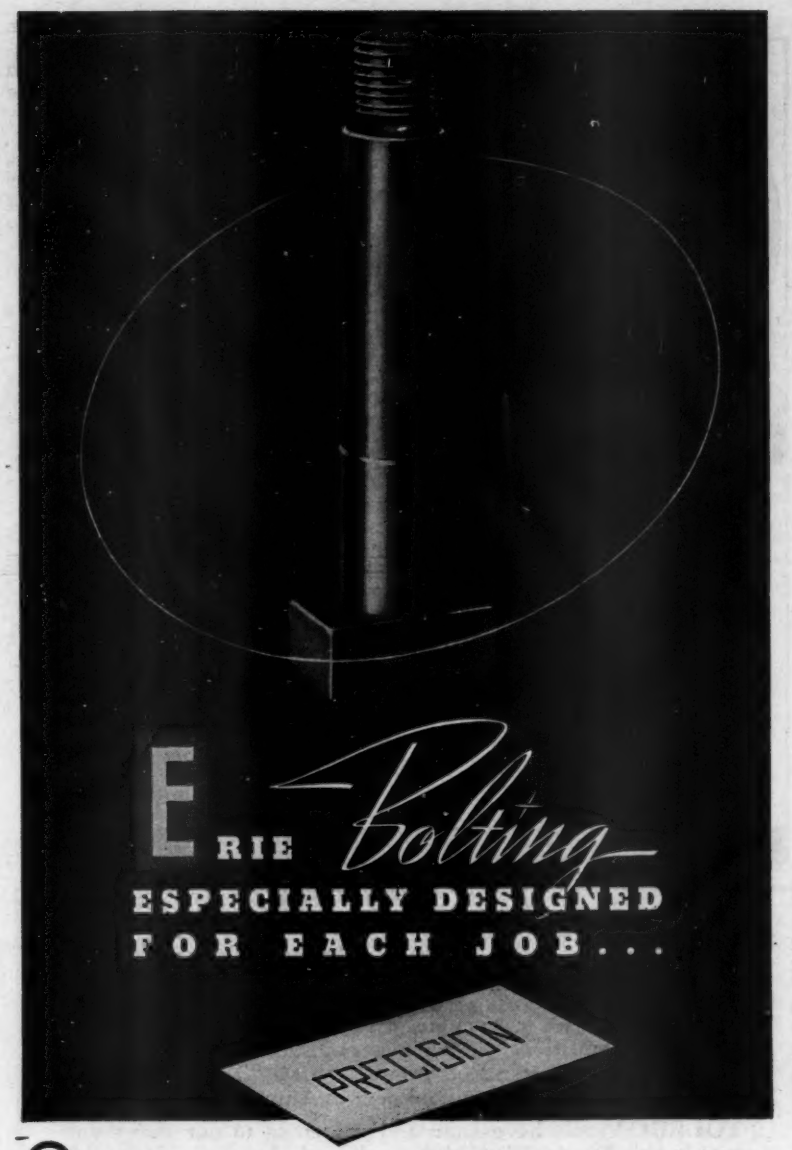
Maryland Test Runs Low And Is Abandoned

PITTSBURGH, Pa. — The Maryland test of William E. Snee et al on the Accident dome in Garrett County was bottomed at 7,183 ft. and will be plugged and abandoned as it was found to be running low. This test was the old No. 1 Speicher, which had been drilled to 5,160 ft. in 1922 and the tools lost and plugged. It was cleaned out and the tools bypassed and fairly good runs were made until at 7,154 ft. the action of the tools was bad and at the total depth action had ceased evidencing an abrupt directional change. However, on the top of the Burkett shale (Genesee) the test was running about 300 ft. lower than the first test on the structure (Schartzer) which ended in the Oriskany sand which was unproductive and on the downthrow side of a fault of considerable thrust. Another location will be made on this structure later.

Except in the Clayton-Thorn pool in Perry County, Ohio, drilling programs for Pennsylvania Grade crude are few and not notable for any success. While published figures state the net Pennsylvania Grade crude stocks are in excess of 2,400,000 bbl., this figure cannot be construed as net available stocks as it includes oil to fill the pipe lines servicing those fields, oil in transit from the fields to tender points and bottoms not available. With the past 12 months as a criterion of draft on stocks by refineries, the present available will be exhausted and the area on a hand-to-mouth existence by summer. Even at present, there are refineries in the area which lack the crude to run at capacity in a war effort. To apply remedial action after stocks are exhausted will avail nothing for many months.

In Southeast Ohio the deep test of the Sinclair Oil Co. on the Longsworth farm in Section 22, Olive Township, Meigs County, is drilling at 7,310 ft. with the top of the Trenton placed at 6,884 ft.

On Chestnut Ridge in South Union Township, Fayette County, New Penn Development Co., William E. Snee et al are drilling at 7,718 ft. in No. 2 Indian Creek Coal Co. and slightly delayed by a gas pocket which upset the tools and bent the stem. This is



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168 ft. below the Tully lime and the Onondaga will be below 8,000 ft. or lower. Here Peoples Natural Gas Co. is drilling at 7,420 ft. or about due for the Onondaga.

SOUTHWEST PENNSYLVANIA COMPLETIONS

Armstrong County, Gilpin Township: Carnegie Natural Gas Co. 2 Peter Klingensmith, 151,000 cu. ft. gas, Thirty-foot sand 1,455 ft., gas 1,496 ft., T.D. 1,504 ft.

Plum Creek Township: John C. Heckman 1 fee, 192,000 cu. ft. gas, Murraysville sand, T.D. 1,092 ft.

Washington County, North Strabane Township: Carnegie Natural Gas Co. 1 Ella M. Larimer, 174,000 cu. ft. gas, Fifth sand 2,550 ft., gas 2,590-96 ft., T.D. 2,847 ft.

WEST VIRGINIA

Jackson County. — The test of the United Fuel Gas Co. et al on the D. J. Rogers farm in Ripley district was completed as a gas well in the Oriskany and is still producing about 9 bbl. of oil a day. The United Carbon Co.'s test on the L. H. Smith farm in this district was abandoned as dry with but a show of gas but about 2 bbl. of oil a day.

WEST VIRGINIA COMPLETIONS

Braxton County, Salt Lick district: Pittsburgh & West Virginia Gas Co. 7937 Godfrey L. Cabot, dry, Blue Monday sand 1,137-73 ft., Big lime 1,185-1,270 ft., Big Injun 1,270-1,395 ft., Fifty-foot 1,635-50 ft., Thirty-foot 1,674-1,736 ft., Gordon 1,890-1,953 ft., T.D. 2,019 ft.

Calhoun County, Sheridan district: South Penn Natural Gas Co. 12 N. T. McConaughey, dry, Injun sand, T.D. 2,317 ft.

Kanawha County, Poca district: Glenn Dearth 2 Robert Wines, 20 bbl. and 300,000 cu. ft. gas, Big lime topped at 1,586 ft., T.D. 1,661 ft.

Lincoln County, Duval district: United Fuel Gas Co. 5206 Horse Creek C. & L. Co., 622,000 cu. ft. gas, Berea, T.D. 2,147 ft.

Mary Lou Gas Co. 1 W. C. Holstein, 1 bbl., Berea, T.D. 2,353 ft.

Mingo County, Hardee district: United Carbon Co. 1 Cotiga Development Co. 458,000 cu. ft. gas, brown shale, T.D. 4,138 ft.

Warfield district: Breeden Oil & Gas Co. 2 Hiram Stafford, 2 bbl., Injun sand, T.D. 1,831 ft.

Monongalia County, Battelle district: Manufacturers Light & Heat Co. 3682 Ada E. Shriver, 68,000 cu. ft. gas, Bayard sand 3,283 ft., gas 3,284 ft., T.D. 3,290 ft.

Putnam County, Curry district: G. H. Summerson 1 H. M. Ashworth, 112,000 cu. ft. gas, Berea, T.D. 2,223 ft.

Ritchie County, Clay district: Pittsburgh & West Virginia Gas Co. 1 Gay Clark, dry, Big lime 1,671-1,748 ft., Big Injun 1,748-1,867 ft., show gas 1,833-35 ft., about 5,000 cu. ft., T.D. 1,969 ft., R.P. 89 lb.

ORISKANY GAS FIELDS

Jackson County, Ripley district: United Carbon Co. 1085 Elizabeth W. Perkins, 3,610,000 cu. ft. gas, Oriskany 5,295-5,333 ft., R.P. 1,570 lb. 48 hr., T.D. 5,335 ft.

United Carbon Co. 1076 Leslie H. Smith, dry, Oriskany 5,088 ft., lime break 5,129-41 ft., sand 5,141-64 ft., show gas at 5,090 ft. and about 2 bbl. oil, T.D. 5,170 ft.

United Fuel Gas Co. et al 5095 D. J. Rogers, Oriskany 5,049 ft., T.D. 5,086 ft., gage 1,614,000 cu. ft. gas and 9 bbl. oil.

Kanawha County, Union district: Godfrey L. Cabot, Inc. 1061 J. L. McLean heirs, 49,000 cu. ft. gas, Oriskany 4,899 ft., gas 4,902 ft., shot 4,900-4,915 ft. without improvement, T.D. 4,960 ft.

KANSAS

Peace Creek Extension Fills 300 Ft. With Oil

NO discoveries were reported in Kansas last week but a number of wells were showing as extensions. First reports were holding high and 15 locations were announced for new wildcats.

Reno County.—A 2-mile outpost well, west of the northern end of the Peace Creek pool, was showing for a producer as the week ended. Fred Koch and C. L. Carlock 1 Russell, SW SE NW 33-22-10w, filled 300 ft. with oil and no water, which apparently was coming from the Viola lime topped at 3,572 ft. Simpson sand was topped at 3,605 ft. and Arbuckle at 3,680 ft., with no shows. Drilled to 3,710 ft., it was plugged back to 3,629 ft. Perforations at 3,562-3,602 ft. put a small amount of oil in the hole but after a shot at 3,572-89 ft. and a 270-gal. acid treatment the hole started filling with oil. Production tests had not been made at last report.

Rice County.—Mercury Drilling Co. 1 Ploog, NW NW SW 5-18-9w, between the Wilkins and Bredfelt pools, was building tanks for production tests after the well was swabbed for 3½ bbl. of oil an hour for 7 hours. Arbuckle lime was topped at 3,229 ft. with saturation at 3,229-30 ft. Gravity of the oil is 48.6 and there was no water accompanying it.

Barber County. — About 5 miles northwest of Sun City, Aladdin Petroleum 1 National Gypsum, SW NW SE 20-30-15w, was a promising pool opener. The well was cleaned out to 4,451 ft., total depth, and filled 100 ft. with oil in 1 hour.

KANSAS COMPLETIONS

Wildcats

Barton County: Appleman 1 McFarland, S½ NE SE 1-16-11w, dry, T.D. 3,364 ft., Lansing 3,013 ft., Arbuckle 3,335 ft., show oil 3,338 ft.

Cowley County: Nadel & Gussman 1 Mohlar, S½ SE SE 27-31-4e, dry, T.D. 3,068 ft., broken Bartlesville 2,962 ft., Mississippi lime 3,055 ft.

Dickinson County: Adair & Morton et al 1 Eggleston, SE NW SW 31-16-1e, dry, T.D. 2,719 ft., Mississippian chat 2,706 ft.

Phillips County: Northern Ordnance 1 J. A. Rowland, SE NW 27-3-17w, dry, T.D. 3,742 ft., Lansing 3,095 ft., Marmaton 3,371 ft., Viola 3,603 ft., Simpson shale 3,655 ft., Arbuckle 3,697 ft., slight show oil 3,158 ft.

Reno County: Barnsdall 1 Morland, SW SW SE 36-25-5w, dry, T.D. 4,016 ft., Lansing 2,790 ft., Misener 3,949 ft., Viola 4,012 ft.

Superior Oil Co. of California 1 Reece, 2-26-9w, dry, T.D. 4,440 ft., Lansing 3,429 ft., Mississippian chat 3,945 ft., Viola 4,230 ft., Simpson 4,314 ft., Arbuckle 4,408 ft.

Rush County: J. J. Lynn 1 Weigand, S½ NE SW 4-18-18w, dry, T.D. 3,955 ft., Topeka 3,199 ft., Lansing 3,505 ft., Arbuckle 3,905 ft.

Russell County: Billings & Spencer 1-A Krug, NE NE SW 8-14-14w, pumped 150 bbl., Lansing 3,078-85 ft., Krug pool discovery.

Saline County: Northern Ordnance 1 Warner, SE NE 10-15-3w, T.D. 3,583 ft., Kansas City 2,116 ft., Mississippi lime 2,746 ft., Hunton 3,155 ft., Viola 3,293 ft., Simpson sand 3,475 ft., Arbuckle 3,510 ft.

Sedgwick County: Sam Springer 1 Sunnydale, NE NE 22-25-1e, dry, T.D. 2,180 ft., Stalnaker 2,138 ft.

Fields

Chase, Rice County: Derby Oil and Carey 4 Link, SE SE 19-19-9w, pumped 150 bbl., Arbuckle 3,252-68 ft.

C. H. Weaver 2 Robbins, SE NE 19-19-9w, pumped 450 bbl., Arbuckle 3,230-49 ft.

Duwe & Farris 2 Hurt, SE NE 22-19-9w, pumped 48 bbl., Arbuckle 3,250-70 ft., T.D. 3,273 ft.

Couch, Cowley County: Adair & Morton 1-A Marble Savings Bank, NE NW NW 13-30-5e, flowed 401 bbl., Bartlesville 2,825-37 ft.

Deichman, Cowley County: Trees Oil 3 Franks, SE NW SE 23-31-4e, flowed 978 bbl., Bartlesville 2,887-2,920 ft.

Hower, Cowley County: Brewer & Adams 1 Aumann, SE SW NW 33-33-3e, pumped 25 bbl., Bartlesville 3,272-3,324 ft.

Kraft-Prusa, Barton County: Solar Oil 5 Schartz, NW SW NE 18-16-11w, pumped 203 bbl., Arbuckle 3,281-93 ft.

Bradley & Marylyn Oil 1 Holder, NE NE SE 12-16-12w, dry, T.D. 3,397 ft., Arbuckle 3,365 ft.

Bradley & Lassen 2 Dolecheck, NE NE NE 13-16-12w, pumped 512 bbl., Sooy sand 3,330-39 ft.

Lindsborg, McPherson County: Dickey Oil 2 Frantz, W½ NE SE 24-17-4w, pumped 672 bbl., Viola 3,390-95 ft.

Carter Oil 2 Rasmusson, W½ NE SE 18-17-3w, pumped 118 bbl., Viola 3,347-58 ft.

Lost Springs, Marion County: Westgate-Greenland 1-A Martin, W½ NW NW 10-17-4e, dry, T.D. 2,388 ft., Mississippian chat 2,322 ft.

Harwood Oil 3 Thompson, NW NE 26-17-4e, pumped 48 bbl., chat 2,335-92 ft.

Pioneer, Rice County: Aylward 1-C Habiger, SE SW 24-19-10w, pumped 77 bbl., Arbuckle 3,270-95 ft.

Raymond, Rice County: Vickers Pet. 1-E Rose, N½ SE SE 19-20-10w, pumped 408 bbl., Arbuckle 3,288-93 ft.

Sellens, Barton County: Transwestern 1 Rude, NE SE NW 1-16-13w, dry, T.D. 3,440 ft., Arbuckle 3,373 ft.

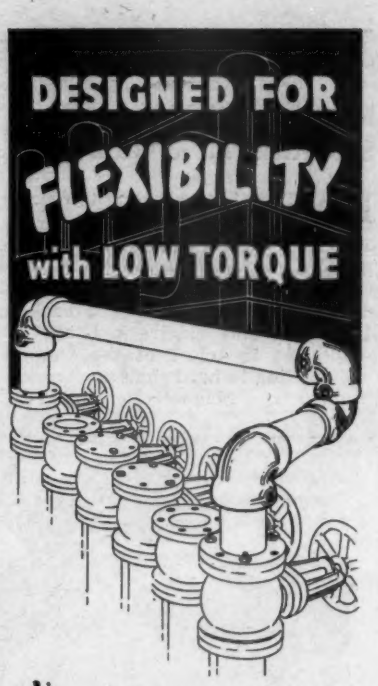
Trapp, Russell County: Coralena Oil 1 Sellens, SW SW NW 19-15-13w, pumped 340 bbl., Arbuckle 3,291-3,310 ft.

FOREST CITY BASIN

ST. JOSEPH, Mo.—O. R. Newcomer and his associates have drilled past 500 ft. at their 1 Acock in SW SE NW 8-64n-39w, Atchison County, Missouri, 2 miles south of the Cities Service Oil Co. 1 Cook, a Bartlesville producer.

Ferguson and Towle have acidized their 1 Della Ehbauer in NW NW NE 2-2n-15e, 2 miles northeast of Verdon in Richardson County, Nebraska, but only a small amount of oil showed. They will acidize higher zones. Earlier, the operators perforated casing at 2,429-33 ft., at 2,418-22 ft. and at 2,411-15 ft. Some oil showed in the higher shots. Hunton limestone was topped at 2,407 ft.

In the McLouth, Kans., oil and gas pool of the Forest City basin, Magnolia Petroleum Co. has completed 2 R. Edmonds as an oil well with a potential of 15 bbl. of oil per day. The Mississippi lime was topped at 1,482 ft. and the hole was shot with 30 qt. from 1,450-80 ft. Total depth is 1,485 ft. Location is SE NW 21-9s-20e, Jefferson County.



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TEXAS GULF COAST

Matagorda Wildcat Sidetracks Bit to Go Deeper

HOUSTON, Tex.—Failing to recover a lost bit in its 1 F. B. Peterson, 3 miles northeast of Van Vleck, Matagorda County, Superior Oil Co. of California, which had reached a total depth of 10,702 ft., plugged back to 10,450 ft. and sidetracked at that depth. At the close of the week it was drilling in hard shale in the sidetracked hole. Magnolia Petroleum Co., drilling at 7,290 ft. at its 1 Anderson Brothers, 1½ miles southwest of Chesterville, Colorado County, reported a distinct distillate odor at 6,671 ft. H. F. Baker reported no shows after running an electrical survey from 5,500 to 5,712 ft. at his Jefferson County wildcat, 1 Louis Grossie et al, 2 miles southeast of Port Neches. The well was making hole at 6,500 ft. in shale at latest report. In the same county Glenn H. McCarthy, Inc., was drilling ahead at 9,031 ft. at 1 Hebert Trust, 4 miles southwest of Viterbo. No program for development of the oil sand in gas-distillate area of Waller and Harris counties has been announced.

Montgomery County. — La Gloria Corp. 1 Grogan-Cochran Lumber Co., which opened the Pinehurst field last December, has been officially completed after a series of difficulties. This well, 3 miles southeast of Magnolia, found pay at 9,710-26 ft. and 8,750-72 ft., and operator obtained permission to make a dual completion. Mechanical troubles were encountered in the effort to make such a completion, and eventually the well was finished with production coming from perforations at 8,760-66 ft. Initial production was 243 bbl. of oil through ⅞-in. positive choke, with tubing pressure 1,450 lb. and gas-oil ratio 2,117.

Harris County.—Cities Service Oil Co. was coring at 6,582 ft. at its 1 Tucker, 3 miles west of the Ogburn field. This wildcat topped the Textularia Warreni at 4,636 ft., Jackson 5,030 ft., Marginulina Cocoensis 5,179 ft., Massilina Pratti 5,310 ft., Hockleyensis 5,403 ft., Dibollensis 6,198 ft., Cockfield 6,287 ft., Discorbis Yeguaensis 6,449 ft. Cities Service was coring at 8,544 ft. at its 1 Witcher, 3 miles northeast of Alief. Only gas odors had been found. Sun Oil Co. 1 Maggie Mansell, 2½ miles north of Katy, cemented 9⅝-in. casing at 2,245 ft. and was waiting for cement to set. It was understood the well would be shut down at that depth pending hearing on permit.

Katy Field Map: The map of a portion of the Katy field on page 149 of last week's issue was printed through the courtesy of Zingery Map Co., Houston.

TEXAS GULF COAST COMPLETIONS

Wildcats

Montgomery County: La Gloria Corp. 1 Grogan-Cochran Lumber Co., 3 mi. SE of Magnolia, 243 bbl. through 3/16-in. positive choke, T.P. 1,450 lb., gas-oil ratio 2,117, perf. 8,760-66 ft., T.D. 11,921 ft., P.B. 9,846 ft., discovery, name Pinehurst field.

Jackson County: John B. Coffee et al 1 Mrs. Rose York, 3½ mi. SE of Ganado, dry at 4,877 ft.

Wharton County: Stanolind 1 A. G. Hudgins, 2 mi. NW of Hungerford, plugged and abandoned at 5,650 ft. (slim-hole test).

Fields

Barbers Hill, Chambers County: Superior Oil & Gas Co. 3-B E. W. Barber, H. Griffith Sur., A-12, O.W.W.O., old T.D. in sidetracked hole 3,776 ft., new T.D. in second sidetracked hole 4,055 ft., 109 bbl. pumping and flowing, through 12/64-in. positive choke, T.P. 75 lb., C.P. 180 lb.

Texas Gulf Producing Co. 29-B Kirby Petroleum Co., H. Griffith Sur., A-12, O.W.W.O., old P.B. T.D. 5,250 ft., new P.B. T.D. 4,069 ft., 206 bbl. through ¼-in. positive choke on gas lift, with input pressure 400 lb., T.P. 80 lb.

Ganado, Jackson County: Texas 8 F. V. Tunison, M.&C. Sur., A-234, 13 bbl. plus 5 per cent salt water through 5/64-in. choke, T.P. 1,790 lb., gas-oil ratio 19,500, perf. 5,096-5,106 ft., T.D. 6,570 ft., P.B. 5,107 ft.

West Mauritz, Jackson County: John B. Coffee 1-A (formerly 2) Westhoff-McCrory, M. L. York Sur., A-312, 123 bbl. through ⅛-in. choke, T.P. 700 lb., C.P. 800 lb., gas-oil ratio 476, perf. 5,456-61 ft., T.D. 5,612 ft.

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SOUTHWEST TEXAS

New Hobson Field in Karnes County Center of Active Play

CORPUS CHRISTI, Tex. — Karnes County, an area of minor general interest until recently, has become a center of drilling and leasing activity since opening of the Hobson pool revealed the presence of an excellent oil sand at relatively shallow depth. Seaboard Oil Co., which brought in the discovery well, 1 Julia Rzeppa, and then completed an offset, 1 Fertsch, producing 146 bbl. of oil daily, is now drilling ahead on 1 Plueckhahn, 1,850 ft. southwest of the Fertsch. Hobson pool wells get a 31.8-gravity oil in the 4,000-ft. level. The size of the Hobson pool is something that further drilling will have to determine. Geologists express no conviction that it is a large one, and some feel that it will prove to be of only moderate extent if not definitely small.

Adding to the importance of this Karnes County development is the fact that the oil is of high-octane quality and that comes from relatively shallow depth. Several major oil companies have blocks of leases in the Hobson area, taken for the most part before the Rzeppa well was brought in, but they and others are reported to have been enlarging their holdings, and many independents have been buying. There has been a scramble for leases and royalties.

Karnes County, which previously had received little attention, underwent active geophysical prospecting and leasing plays in 1941, principally because of its location on the Carrizo-Wilcox trend. Almost every area in the county was worked with magnetometer or gravimeter. Reflection seismograph crews were busy in the southern part. Following this exploratory activity blocks of leases were assembled, and Phillips Petroleum Co. drilled a test, the V. D. Strunk, south of Runge. It was completed dry in February 1942 at 8,514 ft. Four other wildcats were drilled during the year, all failures. Last month, however, Phillips and Adams Oil & Gas Co. opened the Hondo Creek field with 1 Reasoner, 5 miles southeast of Kenedy, at total depth of 8,160 ft. Phillips is now starting work on 1 Baeham, a south offset.

Duval County.—Frank and George Frankel were preparing to make a drill-stem test at their 1 John O. Yates, 2½ miles southeast of the Labbe field. This well topped the Cole at 2,092 ft., Chernosky 2,498 ft., Government Wells 2,851 ft., first Loma Novia 2,972 ft. Quintana Petroleum Corp. 1-B J. F. Welder heirs, wildcat test 3 miles west of the Fitzsimmons field, was drilling at 3,943 ft. in hard sand. It topped the Pettus at 3,740 ft. and the lower Pettus at 3,813 ft.

McMullen County.—Gulf Oil Corp. had encountered no shows at 4,931 ft., where it was drilling in sand at its 1 Two Rivers Ranch Co., 4 miles southeast of Tilden. It topped the Carrizo at 4,412 ft. Humble Oil & Refining Co. was coring in sandy shale at 6,502 ft. at 1 J. B. Dilworth, wildcat 3 miles southwest of Tilden.

Starr County.—T. E. Stephens 1 Gonzales heirs, on which pretty high hopes rested, receives at best a dubious classification. This wildcat, 10 miles north of Roma, ran into mechanical trouble after being drilled to total depth of 5,378 ft., plugged back to 4,263 ft. A squeeze job was under way when the tool stuck around 4,007 ft. At latest report the crew was drilling cement.

LOWER GULF COAST COMPLETIONS

Fields

Duck Bay, Calhoun County: Stanolind 7-B K. L. Welder, Eusedio Hidalgo Sur., 162 bbl. through ⅛-in. choke, T.P. 825 lb., perf. 5,648-49 ft., T.D. 5,651 ft.

Henshaw, Jim Wells County: Rand Morgan 2-H fee, Casa Blanca grant, location abandoned.

Midway, San Patricio County: Midway Victory Oil Co. 1 Ben Ivey, S.A.&M.G.R.R. Sur. 6, A-153, dry at 6,650 ft.

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Seeligson, Jim Wells County: Magnolia 42 A. A. Seeligson, Los Jaboncillos grant, 108 bbl. through 7/64-in. choke, T.P. 825 lb., C.P. 900 lb., gas-oil ratio 787, T.D. 7,000 ft.

South Caesar, Bee County: Seaboard 2 Tom Slick, E. Stapp Sur., A-293, 195 bbl. through ¼-in. choke, T.P. 775 lb., C.P. 1,275 lb., gas-oil ratio 464, perf. 6,578-83 ft., T.D. 6,588 ft.

Woodsboro, Refugio County: Southern Minerals Corp. 3 R. H. Wood et al, Anastacio Reojas Sur., 29 bbl. oil and 1,143,000 cu. ft. gas through 3/16-in. choke, T.P. 2,120 lb., C.P. 2,020 lb., gas-oil ratio 46,950, T.D. 6,040 ft.

SOUTH TEXAS COMPLETIONS

Wildcats

Starr County: Baldridge & King 1 A. Hinjosa, 2 mi. NW of Viboras, dry at 2,206 ft.

Webb County: Forrest Development Co. 1 Bruni, 1 mi. SE of Aviator field, dry at 2,514 ft.

Fields

Aviator, Webb County: George Buck 2 Puig Bros., Alberca de Arriba grant, 120 bbl. pumping, T.D. 1,822 ft.

Labbe, Duval County: L. A. Douglas 1-A Emile Labbe, dry at 2,004 f.t.

Mountain View, Live Oak County: B. F. Hurlbert et al 1 J. G. Riser et al, Amos Moore Sur. 382, dry at 2,160 ft.

North Sun, Starr County: Sun 2 D. Laurel, La Sal Colorado grant, 135 bbl. through 9/64-in. choke, T.D. 700 lb., C.P. 1,200 lb., gas-oil ratio 845, T.D. 5,108 ft.

White Creek, Live Oak County: Buckaloo & Holland 1 W. L. Jackson, B.S.&F. Sur. 15, A-130, dry at 1,886 ft.

SOUTH CENTRAL TEXAS COMPLETIONS

Wildcats

Lee County: Superior Oil Corp. 1 Paul Domann, 1 mi. S of Fedor, dry at 3,518 ft.

ILLINOIS

Illinois Completions Low In Average Production

CENTRALIA, Ill.—The past week's completions in Illinois averaged low in production of oil. There were 22 wells finished of which seven were dry holes.

Forty new operations were reported during the week including eight wildcats. Burr Lambert et al were drilling at 1,505 ft. in 1 E. R. Fitch, SE SW SE 12-1n-9e, Richland County. John J. Callahan et al 1 Becker heirs made a tentative location 350 ft. from N and 330 ft. from E lines NE SW 11-9n-5e, Shelby County. J. W. Myers made location for 1 Charles Hendy, SW SW SE 24-3n-5e, Clay County. D. S. Brooks 2 Valley Farms Co., C NW SE 30-11n-13w, Greene County, was spudded. J. Watkins et al 1 C. Webster, NW SE NW 34-6n-6e, Effingham County, was a location. N. W. Whitten et al 1 John Grossman, NW NW NE 25-1s-9w, St. Clair County, was spudded. Vatter & Braun 1 Dill, NE NW NE 13-3s-10w, Monroe County, was spudded. General Oil & Gas Syndicate made a location in SE NE SW 28-4s-7w, Randolph County.

ILLINOIS COMPLETIONS

Wildcats

Jefferson County, E of Irvington pool: C. V. Richardson et al 1 Niemeier, SW NW NW 14-1s-1w, dry at 1,555 ft., Benoist sand 1,550-53 ft.

Madison County: C. G. Smith 1 Michael, SW NW SE 11-3n-6w, dry at 2,548 ft., Maquoketa shale 2,343 ft., Trenton lime 2,514 ft.

Montgomery County: W. R. Holmes 1 Monke, NW SE NW 31-8n-5w, dry at 752 ft.

Wabash County: Magnolia 1 Shearer, NE SW NE 34-1n-13w, dry at 2,760 ft. Rosiclare 2,638 ft., McClosky 2,658-60 ft. and 2,663-65 ft., tested 1 bbl. oil and 280 bbl. water.

N. V. Duncan 1 Wirth, NW SW NW 23-2s-14w, dry at 3,063 ft., Glen Dean 2,357 ft., Hardwick 2,414 ft., Golconda 2,462 ft., Barlow 2,574 ft., Cypress 2,595 ft., Paint Creek 2,735 ft., Renault 2,792 ft., Ste. Genevieve 2,877 ft., lower O'Hara 2,920 ft., McClosky 2,954-59 ft., 2,766-71 ft., 2,971-84 ft.

Wayne County: N. V. Duncan 1 Beck, SW SW NW 4-1s-7e, (semiwildcat), Cypress at 2,864 ft., Weller 2,894 ft., Paint Creek 2,988 ft., upper Renault 3,088 ft., lower Renault 3,107 ft., Aux Vases 3,140-53 ft., T.D. 3,164 ft.

White County: W. C. McBride, Inc. 1 Howard, SW NE NE 6-4s-14w, dry at 3,257 ft., Menard 2,414 ft., Waltersburg 2,492 ft., Tar Springs 2,580 ft., Golconda deep 2,658 ft., Cypress 2,841 ft., Ste. Genevieve 2,896 ft., McClosky 2,966-73 ft., St. Louis 3,109 ft.

Fields

Akin, Franklin County: Seaboard 9 U.S.C.& C., NE NE NE 26-6s-4e, pumped 197 bbl., Aux Vases sand 3,115-26 ft., shot, T.D. 3,130 ft.

Belle River, Jefferson County, Central Pipe Line 1 Waters-Hopkins, C NW NE 7-3s-4e, pumped 137 bbl. in 11 hr., then 195 bbl. in 24 hr., McClosky lime acidized at 3,070-75 ft., T.D. 3,079 ft.

Clay City, Clay County: McBride, Inc. 2 Berlin, NW SW NE 10-3n-7e, pumped 13 bbl., shot at 2,600-06 ft., T.D. 2,610 ft.

McBride, Inc. 1 DeHart, NW NW SW 10-3n-7e, pumped 33 bbl. oil, 5 bbl. water. Cypress sand 2,586-96 ft., T.D. 2,612 ft.

Clay City Consolidated, Clay County: Pure 3 Flexter, NW SE SE 35-2n-7e, pumped 14 bbl., top of Aux Vases 2,906 ft., T.D. 2,935 ft.

King, Jefferson County: Fabick et al 1 Hail, NE NW SE 33-3s-3e, pumped 146 bbl., pay 2,725-41 ft., shot, T.D. 2,748 ft.

New Harmony, White County: Superior 19 Ford, NE NW SE 4-5s-14w, pumped 95 bbl., shot at 2,592-99 ft. and 2,722-30 ft., Cypress sand 2,590-2,603 ft., Benoist sand 2,715-30 ft.

Noble, Richland County: Pure 1 Betebenner, NW NW NE 35-4n-9e, pumped 9 bbl., shot at 2,541-50 ft., Cypress sand 2,543-52 ft. and 2,554-57 ft.

Pure 38 J. O. Coen, C N½ 9-3n-9e, pumped 91 bbl. oil, 133 bbl. water, Weiler sand 2,597-2,620 ft., shot at 2,600-04 ft., T.D. 2,650 ft., P.B. to 2,632 ft.

North Noble, Richland County: Pure 3 Bower-A, SE SE NW 25-4n-9e, pumped 48 bbl. saturated Cypress sand 2,543-67 ft., T.D. 2,575 ft.

North New Harmony, White County: Jarvis & Marcell 7 Garner, NE SE NW 31-4s-11e, pumped 48 bbl., top Pennsylvanian sand 1,447 ft., T.D. 1,478 ft.

Phillipstown, White County: Jarvis & Marcell 4 H. J. Garner, SE SW NW 31-4s-11e, pumped 35 bbl., Pennsylvanian sand 1,434-66 ft., shot.

Rural Hill, Hamilton County: Texas 2 Hunt, SE SW NW 7-6s-6e, pumped 34 bbl. oil, 9 bbl. water, Aux Vases sand 3,170-90 ft., shot, T.D. 3,194 ft.

Sailor Springs, Clay County: E. B. Gill et al 3 Keck, SE SW NE 35-4n-7e, pumped 10 bbl. oil, 140 bbl. water, Tar Springs sand 2,330-37 ft., shot.

Sims, North, Wayne County: Pure 3 Talbert, SW SE NW 17-1s-6e, pumped 72 bbl., Aux Vases sand 3,031-48 ft., T.D.

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OKLAHOMA

Creek County Has Two Discoveries in Prue Sand

SOME of the state's older producing areas came to the front last week. Creek County had two discoveries completed, producing high-gravity oil and in Stephens County an exceptionally good flowing well was brought in at a shallow depth. Extension wells were reported from other areas.

Creek County.—In the southwest corner of the county, about 2 miles east of the Stroud pool, J. J. Fleet 1 Adams, SE NW 8-14n-7e, recovered 13 ft. of stained Prue sand, placed 25 shots at 2,862-74 ft. and flowed 130 bbl. of 44-gravity oil in 24 hours. Another Prue sand discovery, 2 miles east of the 1 Adams, was completed by Sun Oil at its 1 Frye, SE SE NW 10-14n-7e. This well was shot at 2,730-53 ft. and began flowing by heads, the greatest of which was 179 bbl. in 22 hours. Gravity of the oil was 45.6 and the well was given a potential of 100 bbl. a day. Both of these wells were stopped short of the Wilcox, which produces at around 4,070 ft. in the Stroud field.

Stephens County.—One of the largest wells to be completed in the Velma pool, an area of steep dips and many horizons, Skelly Oil Co.'s 1 Winans, NE NW SW 25-1s-5w, struck a rich pay sand at 1,324 ft. and flowed at the rate of 75 bbl. of oil an hour with the tools in the hole after a 40-qt. shot at 1,478-1,518 ft. The well headed after the removal of tools and flowed 769 bbl. in 24 hours. The flow subsided, however, and additional tests averaged 300 bbl. a day. Total depth was only 1,526 ft.

Love County.—Near the town of Overbrook, and at the south end of the Overbrook anticline, Mudge Oil Co. 1 Tanner, a wildcat in the NE NE SE 6-6s-2e, threatened to blow out when coring at 3,128-39 ft. in sandy shale. The gas was killed with mud and drilling continued. Bottom of Springer sand and top of the Pennsylvanian Caney was 3,060 ft. The well is 3 miles southeast of the Ardmore Springer sand pool, also on the structure, which runs northwest to the town of Long Grove in Carter County.

Oklahoma County.—Gutowsky & Bourland's 1 Wagner, NW NW SW 32-14n-4w, discovery well 4 miles west of the Edmond field, made a number of flowing tests during the week before being shut in for pipe connections. On 12-hour tests the well flowed from 365 to 438 bbl. of 41-gravity oil. Pay zone is the Hunton lime, producing through perforations at 6,938-56 ft. Champlin Refining Co., purchaser of the oil, is laying pipe line from the Edmond district to the well.

Hughes County.—Burke-Greis Oil Co. opened a large gas zone in a workover well in the southern part of the county. The well, 1 Hamilton, 33-4n-9e, was originally drilled by Carter Oil Co. in 1937 and produced some oil from the McLish formation from 5,755-5,954 ft. Old total depth was 6,177 ft. When the well was reconditioned and tested in the Cromwell sand at 4,201-30 ft. it flowed an estimated 22,000,000 cu. ft. of gas a day before being shut in for pipe-line connections.

OKLAHOMA COMPLETIONS

Wildcats

Comanche County: S. T. Moore 1 Moss, NE SW 10-1n-10w, dry, T.D. 1,330 ft., lime stone 1,085 ft.

Creek County: J. J. Fleet 1 Adams, SE NW 8-14n-7e, flowed 130 bbl., Prue 2,860-74 ft., discovery.

Sun Oil 1 Frye, SE SE NW 10-14n-7e, flowed 100 bbl., Prue 2,730-53 ft., T.D. 3,375 ft., discovery.

Rudco 1 Rudeman, SE SW NE 36-14n-10e, dry, T.D. 3,456 ft., Bartlesville 2,160 ft., Booch 2,525 ft., Dutcher 2,625 ft., Viola 3,392 ft., Wilcox 3,432 ft.

Garvin County, 3 mi. SW of Pauls Valley: Hurst et al 1 Paris, SE NE NE 11-3n-1w, dry, T.D. 4,956 ft., sand 3,985 ft., base Pennsylvanian and top Simpson 4,131 ft., McLish 4,170 ft., Joins 4,840 ft., Arbuckle 4,885 ft.

Lincoln County: Danciger 1 Ralstin, NE SW SE 20-17n-2e, dry, T.D. 5,073 ft., Bartlesville 4,450 ft., Hunton 4,647 ft., Viola 4,833 ft.

Logan County: Blackwell 3 Collins, W½ NE NW 13-17n-1e, pumped 63 bbl., Prue 4,335-55 ft., old T.D. 4,892 ft., P.B. 4,542 ft.

Fields

Byars, McClain County: Phillips 1 Goddard.

(Continued on Page 113)

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CANADIAN FIELDS

Large-Scale Production Planned From Tar Sands

CHATHAM, Ont. — Announcement has been made by Hon. C. D. Howe, federal minister of munitions and supply, that the Dominion Government has appropriated $500,000 to spend on improving a plant taking oil from the Athabaska tar sands, and hopes to recover costs from paving material produced for the Alaska Highway. In a detailed review of the oil possibilities of the tar-sands area, Mr. Howe said difficulties remained to be overcome before extensive oil production could be expected. A process for developing the deposits was sought, and the present plant, with improvements, would be used as a pilot plant.

Judging by what had been said about them sometimes, Mr. Howe stated, one would think oil was running out of the tar sands and they had only to be tapped. The facts do not bear out any such idea. Mining methods, separation of bitumen from the sands, treatment of the bitumen to produce marketable products, removal or reduction of the high sulfur content of the crude product, disposal of the overburden on the sands and transportation at reasonable cost were problems which still remained to be solved.

Mr. Howe's review stated that Abasand Oils completed a plant at the sands in 1936, but various difficulties had been encountered. Company representatives consulted with the oil controller in July 1940 and again in 1941. In the fall of that year the plant burned down.

The government made an agreement with Consolidated Mining & Smelting to undertake studies in the tar-sand area, including test drilling, study of the Abasand Oils plant, and research on products to be obtained from the bitumen. The Consolidated report showed much of the Fort McMurray area tar sands to be overlain by a heavy overburden of lean oil sands. Drilling at two points considered promising showed the deposits generally were interlaid with clay and lean sand and varied widely within a short distance. The Consolidated report suggested that if the government proposed further action, an effort be made to prove the Steep Rock tar-sand area by closer spaced drilling, continue reconnaissance drilling seeking rich deposits, arrange with Abasand Oils to expedite changes in the separation plant and refinery, follow up a research program, and organize an engineering staff to prepare preliminary plans of necessary plants and assess generally the full economics of the project.

Not the least of the problems was the high sulfur content of the product. No method of removing the sulfur has been discovered except hydrogenation which requires a very expensive plant. A hydrogenation plant with a capacity to deal with 10,000 bbl. of oil a day would cost more than $12,000,000

The government, Mr. Howe stated, has arranged to take title to the Abasand operation without compensation to the company, and $500,000 would be spent on plant improvements. The old management had been reinforced with the best men who could be found, and everything possible was to be done to put the plant in operating condition for its present rate of capacity as a pilot plant. The government hopes as a byproduct of the research this summer to have a small commercial operation in the production of bituminous material for the Alaska Highway, so that there will be some revenue to offset the expenditure.

Aid Turner Valley drilling.—To expedite the development of marginal drilling sites in Turner Valley and increase crude-oil production there, the federal Department of Munitions and Supply has announced new measures to assist in financing drilling. The financial assistance will be furnished through a new crown company, Wartime Oils, Ltd., with head office at Calgary. A fund has been set aside

(Continued on Page 113)

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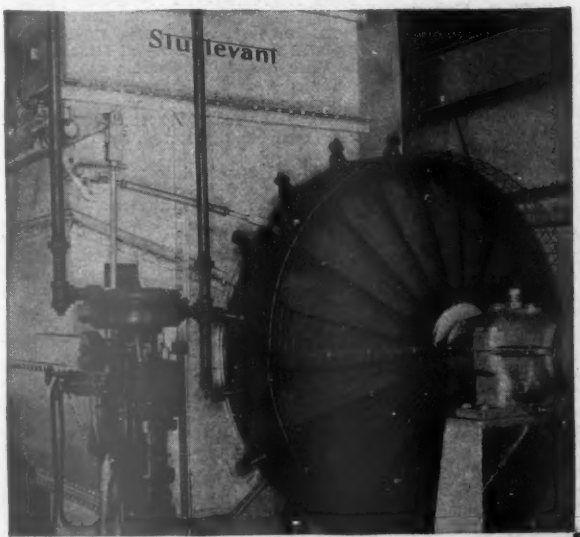

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CALIFORNIA

Heavy-Oil Price Increase Spurs Drilling in Old Fields

LOS ANGELES, Calif.—That recent price increase affecting heavy grades of crude oil has certainly pepped up producers of low-gravity oil and will lead to considerable rejuvenation work in the near future. It will likewise step up the rate of wildcat drilling in areas where heavy crude-oil accumulations can be expected to exist. It may be another 60 days before the full effect of this increase will be felt as increased payments for deliveries are always a month or several weeks later. Deliveries made during the month of April, for instance, will not be paid for until some time during May when the various accounting departments have balanced their books and make return for deliveries during the preceding month. Payments vary all the way from the tenth of the succeeding month to the twenty-fifth depending upon agreements with producers.

Labor shortages have complicated the situation both in the field and in the various offices and this may become more acute as time goes on. Producers had hoped that an increase of 50 cents per barrel would be made as this would stimulate exploration work in a big way. Nevertheless feeling is very good as the recent price increase will take many out of the red and permit limited expansion. The only disconcerting thing in connection with the situation is the acute shortage of drilling and production equipment.

Standard Oil Co. of California has stepped up its reclamation program in San Joaquin Valley fields and this week listed 12 additional wells from which flow strings would be reclaimed and used again on other wells in the same field which will be completed at comparatively shallow depths. General Petroleum Corp. is reclaiming pipe from nine old wells and Tide Water Associated Oil Co. is pulling the flow strings from three old wells at Midway. Most of these wells were completed a number of years ago, when it was customary to land a flow string in addition to rods and tubing. Approximately 75 per cent of the casing recovered can be reclaimed and used again in shallow holes.

Drilling operations in San Joaquin Valley fields producing low-gravity crude oil are showing a substantial and consistent increase. The amount of work under way is sometimes lost sight of because these shallow wells are many times spudded and completed in a few weeks and thus do not appear on drilling reports except as completions.

SAN JOAQUIN VALLEY COMPLETIONS

Belridge wildcat district, Kern County: Petromont Oil Corp. 1 Belridge, 25-28s-20e, abandoned in shale, T.D. 1,518 ft., no important showings logged.

Belridge, South, Kern County: Belridge Oil Co. 36-34 fee, 34-28s-21e, pumped 35 bbl. net, 14.1-gravity, 10 per cent cut, T.D. 775 ft., perf. at intervals 383-775 ft., completed in South Belridge zone of Pleistocene age.

Belridge Oil Co. 46-34 fee, 34-28s-21e, pumped 25 bbl. net, 13.2-gravity, 44 per cent cut, T.D. 791 ft., perf. at intervals 406-788 ft., completed in South Belridge zone of Pleistocene age.

General Petroleum Corp. 27-2 Belridge, 2-29s-21e, pumped 40 bbl., 15.9-gravity, 15 per cent cut, T.D. 996 ft., P.B. 790 ft., perf. 532-666 ft., 686-706 ft., 730-85 ft., completed in South Belridge zone of Pleistocene age.

General Petroleum Corp. 28-12 Belridge, 12-29s-21e, pumped 90 bbl. net, 15.1-gravity, 40 per cent cut, T.D. 1,042 ft., perf. at intervals 875-1,042 ft., completed in South Belridge zone of Pleistocene age.

Coalinga, East, Fresno County: Shell Oil Co., Inc., 172-14 fee, 14-19s-15e, pumped 84 bbl. net, 20.9-gravity, 70 per cent cut, T.D. 2,897 ft., P.B. 2,775 ft., perf. 2,738-75 ft., completed in East Coalinga zone of Miocene age.

Shell 167-26 fee, 26-19s-15e, pumped 80 bbl. net, 20.8-gravity, 18 per cent cut, T.D. 3,310 ft., perf. 2,960-3,135 ft., 3,230-3,306 ft., black shale 2,958 ft., Kreyenhagen 3,295 ft., completed in East Coalinga zone of Miocene age.

Shell 107-29 fee, 29-19s-15e, pumped 40 bbl., 20.9-gravity, 8 per cent cut, T.D. 1,806 ft., perf. 1,168-1,287 ft., 1,312-24 ft., 1,411-42 ft., 1,467-1,506 ft., 1,557-1,607 ft., 1,657-1,758 ft., 1,778-90 ft., completed in East Coalinge zone of Miocene age.

Standard Oil Co. 32-35 fee, 35-19s-15e, pumped 63 bbl., 20.8-gravity, 0.4 per cent cut, T.D. 3,490 ft., P.B. 3,362 ft., perf. 3,221-3,357 ft., completed in East Coalinga zone of Miocene age.

Standard 58-35-A fee, 35-19s-15e, pumped 70 bbl., 20.6-gravity, 2 per cent cut, T.D. 3,330 ft., perf. 3,195-3,307 ft., completed in East Coalinga zone of Miocene age.

Standard 60-35-A fee, 35-19s-15e, pumped 36 bbl., 20.8-gravity, 0.6 per cent cut, T.D. 3,405 ft., perf. 3,367-3,403 ft., completed in East Coalinga zone of Miocene age.

Elk Hills, Kern County: U. S. Navy Dept. 38-27-S, 27-30s-24e, pumped 430 bbl., 19.1-gravity, 6 per cent cut, T.D. 3,219 ft., perf. 3,000-49 ft., 3,069-3,105 ft., 3,125-65 ft., 3,205-19 ft., completed in Tupman zone of Pliocene age.

Helm, Fresno County: Amerada Petroleum Corp. 52-2 Sonnichsen, 2-17s-17e, abandoned in gray sand, T.D. 8,202 ft., no important showings of oil or gas noted.

Kern Front, Kern County: Standard Oil Co. 20-5 fee, 5-28s-27e, pumped 20 bbl. net, 15.1-gravity, 65 per cent cut, T.D. 2,820 ft., perf. 2,648-2,819 ft., N point 2,559 ft., Q point 2,647 ft., R point 2,686 ft., S point 2,790 ft., completed in Kern Front zone of Pliocene age.

Westates Petroleum Corp. 45 Cauley, 16-28s-27e, pumped 120 bbl., 14.8-gravity, 10 per cent cut, T.D. 2,925 ft., perf. 2,824-2,923 ft., completed in Kern Front zone of Pliocene age.

Lodi gas field, San Joaquin County: Amerada Petroleum Corp. 1 Lodi Community, 9-4n-7e, flowed from two productive zones, perf. 2,240-70 ft., flowed 7,200,000 cu. ft. gas, 64/64-in. bean, pressures 355/900 lb., perf. at 2,580-90 ft., flowed 9,800,000 cu. ft. gas, completed in upper zone 2,240-70 ft., T.D. 4,471 ft. in granite, P.B. 2,270 ft., completion opens up new gas field.

Lost Hills, Kern County: Universal Consolidated Oil Corp. 52 fee, 32-23s-21e, pumped 15 bbl., 16-gravity, 35 per cent cut, T.D. 1,726 ft., perf. 1,165-1,725 ft., completed in Lost Hills zone of Pliocene age.

Maricopa wildcat district, Kern County: Texas Co. 2 Pioneer Unit Plan, 33-11n-23e, abandoned in hard shale, T.D. 10,607 ft., no important showings of oil or gas logged.

Midway-Sunset, Kern County: Chanslor-Canfield Midway Oil Co. 90-8 fee, 8-32s-23e, pumped 28 bbl., 13.1-gravity, 12 per cent cut, T.D. 1,460 ft., perf. 1,005-95 ft., 1,320-80 ft., completed in Midway-Sunset zone of Pliocene age.

Chanslor-Canfield Midway Oil Co. 25-25 fee, 25-31s-22e, pumped 30 bbl. net, 18.9-gravity, 18 per cent cut, T.D. 2,350 ft., perf. 2,030-2,300 ft., completed in Midway-Sunset zone of Pliocene age.

Richfield Oil Corp. 7 Fairfield, 11-31s-22e, pumped 24 bbl., 15.7-gravity, 4 per cent cut, T.D. 1,345 ft., P.B. 1,260 ft., 1,190-1,258 ft., completed in Midway-Sunset zone of Pliocene age.

Standard 104-7-D fee, pumped 48 bbl., 16.7-gravity, 2 per cent cut, T.D. 3,128 ft., perf. 2,887-3,126 ft., completed in Wilhelm sand of Pliocene age.

Standard 79-11-D fee, 11-32s-24e, pumped 25 bbl., 15.8-gravity, 2 per cent cut, T.D. 2,525 ft., perf. 2,460-2,523 ft., completed in Midway-Sunset zone of Pliocene age.

Mount Poso, Kern County: Chanslor-Canfield Midway Oil Co. 21 Mon, 26-27s-28e, pumped 20 bbl. net, 15-gravity, 35 per cent cut, T.D. 1,464 ft., P.B. 1,420 ft., 140 mesh perf. 1,390-1,445 ft., completed in Vedder zone of Miocene age.

Shell 25 Vedder-Rall, 9-27s-28e, pumped 118 bbl., 14.9-gravity, 32 per cent cut, T.D. 2,030 ft., perf. 1,985-2,030 ft., completed in Vedder zone of Miocene age.

Rio Vista gas field, Sacramento County: Texas Co. 3 Welch, 32-4n-3e, completed and shut in without making flow test, T.D. 4,270 ft., perf. 4,268-70 ft., completed in Emigh sand of Eocene age.

Texas and Standard joint well, 1-3 Midland fee, 5-3n-3e, flowed 17,793,000 cu. ft. gas daily rate on 20-min. test, 48/64-in. bean, flowing pressure 1,616/1,475 lb., S.I. pressure 1,620/1,618 lb., T.D. 4,260 ft., perf. 3,950-4,260 ft., green sand 3,950 ft., white sand 4,070 ft., completed in Emigh gas sand of Eocene age.

LOS ANGELES BASIN

The Los Angeles city council has of late been accepting a more liberal attitude with respect to the lifting of drilling restrictions in productive areas. During the past week, the council voted to permit drilling in a four-block square in the Wilmington field of Los Angeles County bounded by Ronan, Bay View, Pacific Coast Highway and Q streets. This was recognized as a wartime measure and is considered as proved up for Ranger zone production which comes within the heavy oil classification. Later the council voted to permit drilling operations in a 90-acre tract immediately

west of the west boundary of Beverly Hills extending between Olympic and Santa Monica boulevards. This is the so-called Fox Hills area which has never been thoroughly tested as far as deep zones are concerned.

Shell Oil Co., Inc., is rapidly approaching its objective in the old Salt Lake field in metropolitan Los

(Continued on Page 127)

NORTH LOUISIANA

Wildcat Opens Production East of Ouachita River

SHREVEPORT, La. — Wildcats opened two new pools in this area last week; a low-gravity oil pool in South Arkansas and a gas field in North Louisiana.

Bienville Parish, Louisiana.—Eight miles southwest of the Bear Creek gas field, nearest production, H. L. Hunt 1-A Nebo, SW NE 11-15n-7w, flowed 24,000,000 cu. ft. of gas a day with only a trace of distillate. Perforations were made at 6,836-64 ft. in the Pettit lime. The well was washed out but would not flow until rocked with gas at 500-lb. pressure. Gas started flowing after this treatment at an estimated rate of 5,000,000 cu. ft. a day. It was then acidized with 5,000 gal. Nearest town is Lucky, about 4 miles southeast of the well.

NORTH LOUISIANA COMPLETIONS

Wildcats

Bienville Parish: H. L. Hunt 1-A Nebo, SW NE 11-15n-7w, flowed 24,000,000 cu. ft. gas after acid, 3,700 lb. shut-in pressure, Pettit lime 6,836 ft., perf. 6,836-64 ft.

Concordia Parish: Northern Ordnance 1 General American Life, approx. SE NE 9-7n-7e, dry, T.D. 6,000 ft., Cockfield 1,559 ft., Sparta 2,322 ft., Cane River 3,130 ft., Wilcox 3,582 ft.

Natchitoches Parish: Howard Youree et al 1 Reed, NW SW 36-10n-8w, dry, T.D. 3,948 ft., Midway 1,110 ft., chalk 2,120 ft.

Fields

Sugar Creek, Claiborne Parish: Carter Oil 3 Coleman, SE SE 30-20n-5w, dry, T.D. 6,106 ft., Travis Peak 5,648 ft.

Calhoun County, Arkansas.—Placid Oil Co. 4 Freeman-Smith Land Co., NE NW 2-15s-14w, became the first oil well east of the Ouachita River when it pumped 80 bbl. of 16-gravity oil a day from a shallow sand at around 2,500 ft. A number of dry holes have been drilled in the area to the northwest and southeast of the discovery. Suggested name of the field is Artesian, due to its location 4 miles northwest of the town of Artesian.

Union County, Arkansas.—In the New London field, Marine Oil Co. 1 Mark King flowed 85 bbl. of oil a day through choke in the Buckner zone at 5,794 ft., 199 ft. higher than in any other well of the field.

ARKANSAS COMPLETIONS

Wildcats

Calhoun County: Placid Oil 3 Freeman-Smith, NE SE 14-16s-13w, dry, T.D. 6,927 ft., Nacatoch 2,250 ft., Saratoga 2,578 ft., Cotton Valley 3,058 ft., Smackover 4,924 ft., perf. 4,624-4,734 ft., recovered salt water.

Union County: W. D. Haas 1 Union Sawmill, SW SW 20-17s-13w, dry, T.D. 3,096 ft., Wilcox 1,136 ft., Midway 1,549 ft., Nacatoch 2,330 ft., Saratoga 2,407 ft., Tokio 2,855 ft., show oil, sand and show oil 2,907 ft., Travis Peak 2,915 ft.

Fields

Dorcheat, Columbia County: McAlester Fuel 1 Luther Hunt, N½ SE 15-18s-22w, flowed 200 bbl. distillate through choke, 900 lb. T.P., perf. Cotton Valley 7,934-52 ft., T.D. 8,932 ft.

Midway, Lafayette County: SW NE 9-15s-24w, flowed 13 bbl. of oil an hr. through choke, Smackover porosity 6,430 ft., perf. 6,430-78 ft., T.D. 6,479 ft.

Barnsdall 2 M. F. Creek, approx. NE SW 10-15s-24w, salt-water disposal well, T.D. 6,768 ft.

New London, Union County: Marine Oil 1 Mark King, SE NW 18-18s-11w, flowed 85 bbl. through choke, Buckner 5,794 ft., T.D. 5,812 ft.

Stephens, Columbia County: Lion Oil 1 Stocks, SE SE 10-15s-20w, pumped 225 bbl., perf. 2,537-41 ft., T.D. 2,576 ft.

MISSISSIPPI

JACKSON, Miss.—Two wildcat locations have been staked in southern Mississippi by Gulf Refining Co. One is 1 Mark Wolff, 17-3n-7w, Greene County, and the other is 1 Aden Davis, 2-9n-9w. After setting retainer at 10,235 ft. and cementing off all perforations, Pure Oil Co. was preparing to sidetrack between 10,145 and 10,165 ft. at its 1 J. M. McDowell, in Adams County. Humble Oil & Refining Co. 1-B L. N. Dantzler Lumber Co., Jackson County, was coring below 7,230 ft.

Oklahoma Fields

(Continued from Page 110)

SW NE 21-5n-3e, flowed 170 bbl., Viola 3,514-24 ft.

Isom Springs, Marshall County: Snell 3 fee, NE NW SW 31-7s-6e, dry, T.D. 517 ft.

Loco, Stephens County: Texas 2 Bristow, SW SW NE 8-3s-5w, pumped 12 bbl., T.D. 1,033 ft.

Roper, Seminole County: W. B. Osborne 1-B Brydia, SW SW 23-5n-5e, pumped 47 bbl., Viola 2,514-62 ft.

Seminole, Seminole County: Mid-Continent 4 Marry, SE NW 13-9n-6e, flowed 35 bbl., Hunton 3,988-4,018 ft.

Skedee, Pawnee County: E. W. Whitney 1-A Hayes, NW NE 35-22n-6e, pumped 15 bbl., Prue 2,632-62 ft.

Velma, Stephens County: Skelly 1 Winans, NE NW SW 25-1s-5w, flowed 300 bbl., sand 1,324-1,520 ft., T.D. 1,526 ft.

Skelly 17-B Stifel, SE SE NW 35-1s-5w, pumped 20 bbl., T.D. 904 ft.

Miscellaneous

Muskogee County: McNutt & Young 1 Harrison, NE NW 24-13n-16e, dry, T.D. 1,950 ft.

Osage County: Phillips 16 McCassey, NE NE NW 15-27n-5e, pumped 12 bbl., Burbank sand 2,990-3,056 ft.

Sagamore No. 418, S½ NW SE 8-27n-11e, dry, T.D. 1,916 ft.

Ross Oil No. 14, NW NW SW 14-29n-11e, pumped 8 bbl., T.D. 1,071 ft.

Stephens County: Hal Felmar 1-B Taliaferra, SW SE 26-1s-8w, dry, T.D. 2,803 ft.

R. P. Coats 1-A Slaving, SW SW SE 29-1n-8w, dry, T.D. 2,500 ft.

Canadian Fields

(Continued from Page 111)

for the purpose, and the crown company will advance funds to private companies carrying on development in marginal areas of the proven field, such advances, with interest at 3½ per cent, to be repaid out of the first production. G. R. Cottrelle, federal oil controller, states that the company is intended to assist in financing available sites in proved areas on the west flank of Turner Valley, and that its establishment does not mean that the government is going into the oil business or that the government will finance drilling in other than proved locations. Judge A. A. Carpenter, of Edmonton, chairman of the Alberta Public Utilities Commission, will be president of Wartime Oils, and the other directors will be Col. L. D. M. Baxter, of Winnipeg, general manager of the Calgary & Edmonton Corp.; A. H. Mayland, of Calgary, president of Gas & Oil Products, Ltd., operating a refinery and absorption plant in Turner Valley; and J. Grant Spratt, of Calgary, vice president and managing director of the Anglo-Canadian Oil Co. It is understood the new company will have $3,000,000 available for financing.

It is estimated that there are approximately 75 strictly proven sites in Turner Valley not yet drilled.

Peace River prospect. — According to Hon. John Hart, premier of British Columbia, that province is continuing negotiations with the federal government regarding possible oil development in the Lone Mountain area. This area is in the Peace River block in northern British Columbia. The British Columbia government a few years ago undertook as a public enterprise the drilling of a deep well at Commotion Creek, in the Peace River block, northwest of Lone Mountain. This test, carried to approximately 6,000 ft., was ultimately abandoned; and the provincial government offered the federal government all the potential oil resources of the Peace River area for the war period and 6 months thereafter. The area embraces an extension of the foothills belt east of the Rocky Mountains and while the Commotion Creek test failed to get commercial production, prospects for securing oil in the general area are regarded as favorable. Natural gas in substantial quantities was encountered some years ago on the Pouce Coupe structure in Alberta, east of the British Columbia area.

Vermilion field. — The Vermilion field, eastern Alberta, is expected to return to full production with the reopening of the conditioning plant of Vermilion Consolidated Oils at Borrodaile early in May. The plant shut down in November when the margin for fuel oil over the raw crude was found too slight to make operations

(Continued on Page 120)

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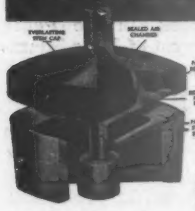

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Among the Drilling Contractors

Crescent Drilling Co. has contract for Harold A. Wright et al 1 Cox, NE SE 8-17s-18w, Columbia County, Arkansas. Work was reported under way last week. Location is northwest of the Mount Holly pool of Union County.

Penrod Drilling Co. will drill a 6,800-ft. wildcat in Bienville Parish, Louisiana, for Placid Oil Co. It is 1-B Nebo Oil Co. in NE NE NE 13-15n-7w. Nearest oil production is about 24 miles to the southwest in Red River Parish, Louisiana.

J. I. Roberts Drilling Co. has contract for a 6,000-ft. test for Youngblood & Foree at 1 Louisiana Central Lumber Co. in 18-14n-3e, northern Caldwell Parish, Louisiana.

H & H Drilling Co. was preparing to move in heavy tools for a 6,000-ft. test, or to the Wilcox sand, after spudding in at 1 Owens, SW SE NE 3-14n-1w, Oklahoma County, Oklahoma, for Ptak Petroleum Co. of Oklahoma City. Location is southwest of the town of Arcadia and east of the Edmond area. A block of 2,500 acres has been assembled by Harold Westcott et al.

Trigg Drilling Co. has a Viola lime contract for Anderson-Prichard Oil Corp. 1 Willy, SW NW NE 28-5n-3e, McClain County, Oklahoma. Location is at the southern tip of the Byars pool.

Housh & Thompson Drilling Co., Houston, Tex., has started work on 1 Tucker, a wildcat test for Cities Service Co., in the Addicks area of Harris County, Texas. Projected depth is 8,000 ft. This contractor is building a 2-mile road and laying gas line for a wildcat 5 miles east of Hull, in Hardin County. This test, the 1 Weiss-Hudson, for Northern Ordnance, Inc., is also to go to 8,000 ft.

Morris-Hamilton Drilling Co., Houston, Tex., has started a workover job on 5-G Gray, in the Vinton field, Calcasieu Parish, Louisiana, for Union Oil Co. of California.

Falcon-Seaboard Drilling Co., Houston, Tex., contractor, and Vincent & Welch, Louisiana operators, are near completion depth at 1-B Miller, an outpost test in the Tepetate area of Acadia Parish, Louisiana. The oil sand was picked up at 8,711-56 ft., but the operators were drilling deeper before plugging back to set casing for completion.

Allied Well Service, Inc., Houston, Tex., has begun two workover jobs for Three Bee Investment Corp., both in the Dickinson field, Galveston County, Texas. One is on the 4 Way, the other on the 1 Deats.

Arrow Drilling Co., Houston, Tex., is in mechanical trouble at 7,100 ft. in a sidetracked hole being drilled for Fifteen Oil Co. in the Charenton Beach area of St. Mary Parish, Louisiana. The well is 4 South Coast. After going to 9,230 ft. in 3 South Coast in that area for the same company the hole is to be abandoned.

Golding-Farish Drilling Co., Houston, Tex., was preparing to spud 1 Tassie Lotz, in the Jamison Survey, Chambers County, Texas, for D. M. Wallace, Houston independent operator, and associates. This contractor was near completion depth at 1 Levy, for W. Stewart Boyle and Sterling Oil & Refining Co., in Jackson County. This well is the opener of the new Sterling field.

E. B. Gooden, Mount Vernon, Ill., has contract for a wildcat McClosky test for Nash Redwine, independent producer, at the 1 Sigler. Location is 1 mile north of the town of Dixie in Henderson County, Kentucky. Rotary tools will be used. Acreage for the test was farmed out by Sun Oil Co.

Roy Guffey, Dallas, Tex., has been awarded contract to drill wildcat test in Cooke County, Texas, south of the Walnut Bend pool, for Fred Snuggs, McElreath & Suggett, and Seitz, Comegys & Seitz, on the Percy McGeorge fee in Block 64, Fannin County School Land.

Ungren & Frazier are the drilling contractors on a well to be drilled for Harry Hines, Dallas, Tex., location for which has been made and machinery is being moved. The test is 330 ft. each way from the southwest corner of the north 80 acres of the west 120 acres of B. A. Stephenson

fee Section 7, T.&P.R.R. Survey, Block 16, Jones County, Texas. The test will be drilled to 2,500 ft. The location is about 2 miles northeast of the Akard pool. Well will test the Flippen, Cook and Hope producing horizons of that area.

A. R. Dillard, Wichita Falls, Tex., will drill a 5,500-ft. test for Continental Oil Co., known as 1 G. T. West, in the G. W. Scott Survey, 1½ miles west of Wichita Falls, Wichita County, Texas.

T. C. Means, Jr., Dallas, Tex., formerly associated with **John O'Neal Drilling Co.**, Lubbock, Tex., is now associated with **Roy Guffey**, drilling contractor of Dallas.

Claude McQueen, of Rushville, Mo., is the drilling contractor on O. R. Newcomer et al 1 Acock, in SW SE NW 8-64n-39w, north of Fairfax, Atchison County, Missouri. Test has been spudded in an attempt to extend production approximately 2 miles south from the Cities Service Oil Co.'s discovery well. Contractor is using a light portable rotary. The hole will go to the Bartlesville sand, which is the pay horizon in the Cities Service well.

Kerbow Drilling Co., Olney, Tex., has been awarded contract to drill a test for J. Ben Russell, of Oklahoma City, Okla. The 1 Wiseley, in SW NW NW 28-2s-10w, Cotton County, Oklahoma, has been started, about 2½ miles east of Walters. Contract is for 3,200 ft. on the Arbuckle.

Noble Drilling Co. and **Stanolind Oil & Gas Co.** were near 4,000 ft. at the 1 Moyer, in C NE NW 25-3s-12w, Cotton County, Oklahoma, on a seismographed block.

W. W. Zimmermann has the contract on Davenport & Lockhart 1 First National Bank of Mission, Tex., 660 ft. from the north lines and in the center between the east and west lines of Share 41-B, Porcion 80, 1,320 ft. south of the 1 Caffarelli, central Starr County, Texas. Test is drilling under surface casing, 10¾-in., set at 200 ft. The hole will go to 4,250 ft.

Big Chief Drilling Co. has the contract on W. E. Hightower et al 1 W. H. Young, in SE SE NE 11-14n-4w, 4 miles northwest of the Edmond and about 5 miles northeast of the Gutowsky-Bourland pool opener in northwestern Oklahoma County, Oklahoma. The well is contracted to the Wilcox sand or 6,800 ft. Location is on a structure worked by Kenneth Ellison, and which has been seismographed at least once.

Richard Murphy, drilling contractor, last week completed a good oil well for Sawyer Producing Co., Bolivar, N. Y., at a depth of 1,300 ft. in 7 days. The well was located on the Beers lease in Forman Hollor, Town of Bolivar. Members of the drilling crew were Earl McCaslin, Cornelius Loucks, Clifton Schoonover, drillers; John Mix, Arnold Loucks and John Raymond, tool dressers.

Big West Drilling Co., Oklahoma City, Okla., will drill a wildcat test for Stanolind Oil & Gas Co. on the Corbin land, C SE SE Section 275, Block 4, M.&G.N. Survey, Armstrong County, Texas. Rig was building and drilling materials were being moved to the location.

Glenn A. Campbell, drilling contractor and oil operator of Tulsa, has been called to Washington, D. C., as senior petroleum production analyst for PAW, and will be assigned as chief of the priorities unit. Mr. Campbell is vice president for rotary drilling of the American Association of Oil Well Drilling Contractors.

Noble Drilling Co., drilling Pure Oil Co. 1 Cox, in SW SE SW 16-5n-8ecm, in the northeast part of Cimarron County, Oklahoma, was reported to have set casing at 4,988 ft. This well was started last December as an 8,000-ft. Ordovician test.

Fain Drilling Co., who has the contract for Continental Oil Co. 1 Clark, in SW SW NW 17-16n-1w, Logan County, Oklahoma, east of Guthrie, was due to spud early this week. Contract is to the Wilcox sand.

Davis Drilling Co., of Wewoka, Okla., has the contract on W. B. Osborn and Superior Oil Co. 1 Mansur, in NW SW SE 26-18n-6e, Payne County, Oklahoma, east of Drumright. Surface pipe was set at 106 ft. and test was drilling ahead.

Olson Drilling Co., who has contract for 9,750 ft. on Northern Ordnance 1 Bradshaw, in C SE SE 28-22n-17w, Woodward County, Oklahoma, was drilling at 4,343 ft.

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PERSONALS

HARRY WHEELDON

Promotion Climaxes Long Service With Lone Star Group

TWENTY-ONE years of service in the natural-gasoline department of the Lone Star organization by Harry Wheeldon were rewarded last week. He was promoted to the position of superintendent of natural-gasoline plants, filling a post which became vacant March 27 with the death of J. R. Jarvis. Mr. Wheeldon had been assistant superintendent under Mr. Jarvis since 1939.

The new superintendent is a graduate of Texas A. & M., where he obtained a degree in chemical engineering in 1922. He joined Lone Star the year of his graduation and has worked in most of the company's major gasoline plants. He became superintendent of the Gainesville, Tex., plant in 1925, serving in the same capacity at Petrolia in 1926 and Gordon in 1927.

Mr. Wheeldon was made superintendent of gasoline plants in the Ranger, Tex., district in January 1937 and continued in that capacity until he was transferred to Dallas as assistant superintendent in 1939.

Mr. Jarvis had served as superintendent of all gasoline plants since January 1, 1924, and was a pioneer in this phase of the industry. He too was a graduate of Texas A. & M., being one of the first students to receive a degree in chemical engineering. At the time of his death, he was a vice president of the Natural Gasoline Association of America, which he helped to found.

Walter Wells, Consolidated Oils, Ltd., Caracas, Venezuela, and **T. J. Walne,** Neil & Massey Co., Ltd., Port-of-Spain, Trinidad, were the foreign oil men attending last week's regular monthly meeting of the Houston, Tex., chapter of Nomads. Other guests included **J. C. Ballagh,** Patterson-Ballagh Corp., Los Angeles, Calif.; **William Alliger,** manufacturers' representative, Houston, and **R. Hoesbein,** M. H. Detrick Co., Chicago.

O. V. Henry, previously superintendent of the Reed City, Mich., district for the Ohio Oil Co., has been made general superintendent of production for the Michigan division. Other personnel assignments resulting from the Ohio company's increased operations in Michigan follow: **D. L. Province,** formerly district foreman at the Reed City and Cedar fields, has been appointed district superintendent. **E. J. Fredell,** in charge of company properties at Sunburst, Mont., prior to their recent sale, has been transferred to the Reed City field where he succeeds Mr. Province. **J. H. Shonk,** foreman in the Haynesville, La., district, has been transferred to Michigan and appointed foreman of the Cedar field. W. O. Henderson, formerly in charge of properties in the Luby field, Houston, Tex., division, has been appointed farm foreman in the Cedar field.

Les L. Cummings, formerly petroleum engineer for Trinity Portland Cement Co. in Houston, Tex., and before that a star blocking back and line backer on the Texas A. & M. football teams of '34, '35, and '36, has been commissioned a Navy ensign and is taking his indoctrination course at Dartmouth College, Hanover, N. H. Ensign Cummings was cocaptain of the Aggie eleven in 1936, and he received his degree in petroleum engineering in 1938, following which he joined Trinity Portland Cement Co.

Lee Scherer has been made mechanical supervisor at Standard Oil Co. of Ohio's No. 2 works at Cleveland, Ohio. He was transferred from the company's Latonia refinery to replace **Alex Balharrie,** Cleveland, master mechanic, who recently retired.

Lt. Col. Robert M. Bacher, formerly in the engineering department of Humble Oil & Refining Co. in the Tomball field, Harris County, Texas, is now commanding officer of the Pantex Ordnance Works, Amarillo, Tex. Previously he had filled similar posts at ordnance plants in Baytown, Tex., and Newport, Ind. His recent transfer was from the latter city. Colonel Bacher was promoted from major in May 1942.

Harry Theis and **Robert Hense,** formerly in the engineering department at Standard Oil Co. of Ohio's Latonia refinery, have been transferred to similar posts at the company's Cleveland plant. **Wilbur Moran,** also previously stationed at Latonia, has been transferred to a position in the metal-inspection department of the Cleveland office. **Lester Mills,** assistant metal inspector at Toledo, Ohio, has been made chief inspector at Latonia.

John R. Moran, vice president of Manning & Martin, Inc., drilling contractors of Denver, Colo., and Casper, Wyo., has resigned that position to return to the Continental Oil Co. and is now making his headquarters at Houston, Tex.

Gay Dorough, scout for the Gulf Oil Corp. in Montana, became the father of an 8½-lb. son on April 2.

Frank Winiger, of the Texas Co. land staff, and Verna Dye, formerly with the Superior Oil Co. in Denver, were married at Great Falls, Mont. Mr. and Mrs. Frank Gower of the Texas Co. headquarters in Denver, Colo., were attendants.

Fred Townsend, superintendent of natural-gasoline plants in the East Texas district for Lone Star Producing Co., has been transferred to Dallas, Tex., and promoted to assistant superintendent of general operations. He joined Lone Star in 1927 as testing engineer at the Gordon, Tex., plant, served as chemist at Petrolia

and Gordon for the next 2 years and, in 1932, was transferred to Ranger, Tex., as chief chemist for the district He became superintendent of the Gordon plant in 1933. In May 1941 he was made superintendent of the East Texas district.

WM. GRANT, JR.

William Grant, Jr., assistant chief safety engineer for Humble Oil & Refining Co., Houston, Tex., and vice president of the Texas Safety Association, is general arrangements chairman for the annual Texas Safety Conference to be held in Houston April 27-28. The conference will bring together for simultaneous conventions and joint sessions the Texas Safety Association and the Texas Police Association. Serving with Mr. Grant on the program committee for the safety association are **C. A. Miller,** Texas Co., Houston, and **C. J. Rutland,** Texas Power & Light Co., Dallas. **Brig. Gen. Walter B. Pyron,** vice president of Gulf Oil Corp., Houston, now on leave of absence with the U. S. Army, in Washington, D. C., is head of the Texas Safety Association. **R. B. Roaper,** Houston, chief safety engineer for Humble, is a vice president.

Charles J. Lewis, who was laboratory assistant first class at the Baytown, Tex., refinery of Humble Oil & Refining Co. before he enlisted for war service, has been promoted to first lieutenant at Camp Maxey, Paris, Tex., where he is stationed.

W. J. Lawson, who resigned as secretary of state under Gov. Coke Stevenson of Texas, is now public-relations manager for the J. S. Abercrombie defense project at Sweeny, Tex., where an aviation-gasoline plant is under construction.

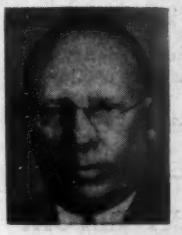
A. L. Dunks, fireman at the Baytown, Tex., refinery of Humble Oil & Refining Co. until he entered war service, has been commissioned a second lieutenant. He is stationed at Camp Hood, Texas, where he is an instructor in the tank-destroyer school.

Alvin Jackson Clark, assistant purchasing agent and general stores manager in the Texas Gulf Coast area for Shell Oil Co., Inc., until he entered military service in June 1942, has been promoted to a captaincy in the Seventy-second AAF Contract Basic Flying School, Bush Field, Augusta, Ga. Previous to 1926, when he joined Shell, Mr. Clark was employed by Standard Oil Co. of Indiana at Casper, Wyo.

George A. Hill, Jr., president of Houston Oil Co., Houston, Tex., and of the San Jacinto Museum of History, was the principal speaker at ceremonies attending launching of the Liberty ship David G. Burnet at the yards of Houston Shipbuilding Corp. Saturday, April 17. The boat is named for the first president of the Republic of Texas.

M. M. Quesenbery, of Tulsa, recently received an engraved certificate and lapel emblem containing three diamonds and a ruby in recognition of the 35 years he has been in active service with Gulf Oil Corp. The award was presented by Rush Greenslade, vice president of the Tulsa division.

William K. Tell, counsel for the District 2 petroleum industry committee and secretary of the general, marketing and refining committees, has resigned. He joined the legal department of the Ohio Oil Co., Findlay, Ohio, April 19. Mr. Tell had been attached to the District 2 committee offices in Chicago, Ill., since their establishment September 1, 1941.



OTTO D. DONNELL

Otto D. Donnell, president of Ohio Oil Co., Findlay, Ohio, has been appointed chairman of the general committee of District 2, PAW, to succeed **Frank Phillips,** chairman of the board of Phillips Petroleum Co., Bartlesville, Okla., who recently resigned because of ill health. Mr. Donnell has been chairman of the production committee of the district.

Hubert C. Stipp, for 9 years division engineer for the Texas Railroad Commission at Big Spring, Tex., has resigned to accept position with Cosden Petroleum Corp. at Big Spring. Mr. Stipp formerly was district superintendent for Pure Oil Co. and Texas Pacific Coal & Oil Co., and joined the staff of the commission at Henderson in 1932. He is a graduate of Oklahoma University.

Felix Mendoza has been reelected president of the Colombian Petroleum Institute for 1943. Other officers are **J. O. Bower,** vice president; **H. B. Richardson** and **R. L. Morris,** vocals; **Rafeal Valencia Samper,** secretary-treasurer, and **Paul H. LeFevre,** fiscal auditor. Membership in the institute has increased to 149 from the original group of 13 who organized it a year ago. The central office of the institute is in Bogota and supplementary branches are planned in Barranca Bermeja and La Petrolera. Consideration is being given to the establishment of an annual award "to the member who presents the best thesis or to the member who most efficiently contributes to the development of the petroleum industry in the country."

L. P. St. Clair and **Stanley W. Morshead** were recently reelected president and vice president, respectively, of the Independent Oil Producers Agency at the annual meeting of the agency held in Bakersfield, Calif.

KRAUS EARHART

Kraus Earhart, Houston, Tex., has been advanced from senior security engineer to director of the Facility Security Division of District 3, PAW, it was announced last Saturday by **D. E. Buchanan,** district director in charge. Since last November Mr. Earhart has been on leave from Texas Co., which he served as safety engineer and member of the personnel department. In his new post he will supervise oil-plant protection measures. He is chairman of the Gulf Coast chapter of the American Society of Safety Engineers.

C. S. Corbett, of the geological staff of Socony-Vacuum Oils, will have charge of a geological office recently opened by his company at Calgary, Alberta, for the purpose of keeping in touch with development in that province.

R. Harry Maupin, New York, has been appointed traffic manager of Pan American Petroleum & Transport Co., and subsidiaries. He had been assistant traffic manager since January 1920, when he joined the Pan American organization after about 10 years' experience with various railroads

Shifts: **Ralph L. Gray,** engineer, Stanolind Oil & Gas Co., Fort Worth, Tex., to Tulsa; **Richard J. Lee,** engineer, Humble Oil & Refining Co., Midland to Pleaston, Tex.; **C. L. Chase,** geologist, Texas Co., Midland, Tex., to Madison, Wis.; **Charles A. Luts,** engineer, Stanolind Oil & Gas Co., Odessa to Fort Worth, Tex.; **Charles F. Redmon, Jr.,** engineer, Phillips Petroleum Co., Abbeville to Erath, La.; **W. E. Brogan, Jr.,** engineer, Magnolia Petroleum Co., Opelousas, La., to Crawford, Neb.; **K. M. Lawrence,** geologist, Amerada Petroleum Corp., Wills Point, Tex., to Hot Springs, S. D.

Market Developments

East Coast

NEW YORK.—The supply situation on the East Coast continued to deteriorate this month as a result of unusually cold weather which was accompanied by abnormal heating-oil consumption and as a result of the recent lifting of the ban on pleasure driving which materially increased consumption of gasoline. These two factors combined with the heavy export shipments to reduce available supplies for civilian requirements to the lowest point of the season.

The continued deterioration came despite the large increase in tank-car shipments since the inauguration of operations on the first leg of the 24-in. pipe line. This increase has amounted to from 10 to 15 per cent.

A marked improvement in the lubricating-oil situation has become apparent and an impending order to restrict sales of oils suitable for aviation use has been delayed. It is reported that bright stock which had been in critical demand has become easier and that fairly large quantities are being offered. Lubricating oil manufacturers have been urged to push sales of lighter oils for motor-car consumption. These oils are entirely satisfactory for use in cars operating under today's conditions and their disposal would correct the serious neutral situation and at the same time restrict bright-stock consumption. This move would also permit acceleration of the stock piling program for aviation lubes.

Mid-Continent

ORDERS for regular motor fuel, particularly from the agricultural districts of the Middle West, continued this week in such volume that some Mid-Continent refiners are relying on contemporaries to supply part of their requirements. Quotations, of course under prevailing circumstances, remained unchanged at the ceiling level.

Refiners were willing to concede that the existing close balance between gasoline production and demand might not exist but for the general downward adjustment last winter and this spring in motor-fuel yields. Furthermore, crude runs to stills are lower in some plants than would prevail under a less rigidly regulated schedule.

Northern consumers continued active in the heating-oil market despite moderation of temperatures. Part of the current buying is a reflection of the hand-to-mouth purchase of supplies throughout the winter, thus forcing a continuation of day-to-day purchases as long as weather conditions require operation of home heating units.

Residual fuel-oil demand is undiminished. Manufacturing centers and railroads are continually inquiring for additional supplies. Purchases of fuel oil in 1942 by Class 1 railroads totaled $99,767,000 compared with $77,517,000 in the preceding year. Only a fraction of the indicated increase of 30 per cent is assignable to general advances in prices.

Gulf Coast

HOUSTON, Tex. — Much of the uneasiness that pervaded the refinery market in recent weeks has disappeared with the relaxation in demand from the East Coast for heating oils and with the enhanced ability of refiners to adjust operations to war conditions. In the case of gasoline, the situation this week was described as improved. Contributing to the healthier condition is a growing requirement for regular motor fuel at military training camps. Deliveries are made by truck, with relatively short hauls, affording relief to refiners who have been having a hard time finding outlets for anything but aviation-grade material.

Although the demand for No. 2 heating oil for immediate use has slackened, creating a slightly easier market for that product, movement of the output from this to northern and eastern points continues to be a matter of high importance. Plans call for shipment to points of consumption in sufficient volume during the coming warm weather to preclude repetition of last winter's acute shortages. Some refiners in the Corpus Christi area, with no pipe-line transportation yet available and dependent upon inadequate rail facilities, report that their accumulation of No. 2 oil is beginning to back up.

Recent reallocation of tank cars has left some refiners with reduced means of moving their products, but it has correspondingly improved the situation of others who were in straits. Comment of both "givers" and "takers" indicates shifting of cars has been accomplished with an eye to treating all classes of refiners fairly.

Little change is observable in the general character of the Gulf Coast market. Kerosene continues to be the tightest item in the list of refinery products.

Pacific Coast

LOS ANGELES, Calif. — California markets continued relatively quiet but there was a tendency toward slightly higher prices for the small amount of gasoline that moved in the spot market. These gains were only fractionally higher.

Fuel oil and gas oil continues in good demand and what has been moving has commanded highest prices. Refiners have been spending considerable time developing properties that produce low-gravity oil to meet the demand for fuel and by the end of the year will have a much larger potential production of heavy oil.

Current demand for fuel oil, which is probably the highest ever attained, will require maximum production and sustain an active market for straight-run residuals. Straightrun residuum is in good demand because it only requires a minimum amount of blending agents, either gas oil or other light fractions. The amount of blending agent required obviously governs the cost to the refiner due to the higher price commanded by gas oil.

Refiners appear to be running more heavy crude oil than heretofore and it is natural that production of light refinable crude oil should be reduced due to the pileup of gasoline stocks.

A.P.I. REFINERY REPORT

Week Ended April 10, 1943

(Figures in thousands of barrels)

	Dly. crude runs to stills	Stocks: Gasoline	Stocks: Residual	Stocks: Gas oil
Appalachian	155	2,468	457	905
Ind., Ill., Ky.	690	20,073	2,275	3,336
Okla., Kan., Mo.	329	7,254	1,341	1,614
Censored area*	1,683	40,483	10,161	13,960
Rockies	95	2,051	480	348
California	725	20,883	52,471	11,015
Total 4-10-43	3,677	93,212	67,185	30,908
Total 4- 3-43	3,624	93,409	67,483	30,732
Total 4-11-42	3,502	105,566	81,947	29,567

*Reports combined on East Coast, Texas Gulf, Louisiana-Arkansas and Inland Texas at request of PAW.

CRUDE-OIL STOCKS

(Bureau of Mines Estimate)

Week ended:	Bbl. of crude*
April 10, 1943	239,925,000
April 3, 1943	239,864,000
April 11, 1942	256,442,000

*Excludes unrefinable California stocks.

Refinery Prices

(Prices as of April 20)

Quotations are f.o.b. plant in cars and in cents per gallon except where otherwise noted. They are exclusive of the federal excise taxes of 1.5 cents a gallon on gasoline and 4.5 cents a gallon on lubricating oils, and do not include marine lighterage charges.

REFINERY GASOLINE

Octane (A.S.T.M.):	†80	74-76	72-74	68-70	63-66
Mid-Continent*	.....	.....	5.875-6.000	.....	5.500-5.625
Pennsylvania	.....	6.750-7.000	.....	.....	.....
Gulf Coast‡	6.00-6.50	.....	§5.750-6.250	§5.750-6.250	§§.250-5.750
Northeast Coast	9.80	.....	9.2	9.2	.....
California	.....	6.125-6.500	6.000-6.125	5.500-6.000	5.000-5.250

*Basis Group 3. †1939 C.F.R. (research method). ‡Integrated companies restricted to lowest prices. §Unleaded.

KEROSENE AND NO. 1 FUEL OIL

Gravity:	46	45	42-44	41-43	38-40
Mid-Continent*	.....	.....	4.500	4.375	.....
North Louisiana	.....	.....	.....	4.500-4.750	.....
Pennsylvania	6.250-6.625	6.125-6.250	.....	.....	.....
California	.....	.....	.....	4.500-5.500	4.250
Northeast Coast	.....	.....	.....	6.80	.....
Gulf Coast	.....	.....	.....	4.125	.....

*Basis Oklahoma Group 3.

TRACTOR, DIESEL, AND BUNKER FUEL OIL

Specifications:	46-48° G.	24 D.I.	48-52 D.I.	56 & above	Diesel bunkers	Residual Bunker C§
Mid-Continent*	4.125	.....	.....	.....	.....	$0.80-1.27
California	.....	2.750-4.000	.....	.....	‡1.45-1.50	0.95-1.00
Gulf Coast	.....	.....	4.000	4.125	1.45	0.85-1.27
Northeast Coast	.....	.....	.....	6.800	2.780	1.65-2.07
North Louisiana	.....	.....	.....	.....	.....	0.80-1.27

*Basis Oklahoma Group 3. †10-14° gravity. ‡Pacific Specification 200. §Gravity range.

FURNACE OIL, GAS OIL, FUEL OIL

	No. 2	No. 3	No. 5	No. 6
Mid-Continent*	3.625-3.750	3.500-3.625	$0.85	$0.80
Pennsylvania (West)	5.875-6.125	5.875-6.000	†5.250-5.500	.....
Northeast Coast	6.7	6.7	1.95	1.65
California	5.5	5.5	‡1.10-1.25	§1.10-1.15
Gulf Coast	3.875-4.0	.....	1.65	0.85

*Basis Oklahoma Group 3. †36-40 gravity fuel. ‡Pacific Specification 300. §Pacific Specification 400.

NATURAL GASOLINE

Grades:	26-70	18-55
Oklahoma (Group 3)	3.875	4.650
North Texas	3.500	4.200
North Louisiana	3.625	4.350
California	4.875	5.500

LUBRICATING OILS

Bright and Steam Refined

OKLAHOMA (Group 3)—		
200-210 D, 10-25		27.00
150-160 D, 0-10		23.00
120-125 D, 0-10		22.00
Stea refined:		
600 dark green (untreated)	9.00	9.50
PENNSYLVANIA—		
Bright Stocks (Pennsylvania Grade No. 8 color, 140-150 at 210, 545-550 flash)		
10 pour point		30.50
15 pour point		29.50
25 pour point	25.00	28.00
Steam refined:		
600	15.00	16.00
650	15.50	16.50
600 flash	16.00	17.50
630 flash	17.00	17.50

Neutral Oil

(Vis. at 100° F. except Pennsylvania and color N.G.A.)

OKLAHOMA (Group 3)—	
0-10 pour point:	
200-3	15.00
300-3	18.00
500-3	19.50
600-3	20.00

Note: Viscous neutrals, 10-25 pour, quoted 0.5 cent under 0-10 oils.

Neutral Oils

CALIFORNIA—		
Pale Oils:		
200-2½-3	7.00	7.75
400-3-4	7.25	8.00
600-3-4	8.75	11.00
Red oils:		
200-4-5	7.00	7.75
400-5-6	9.00	11.00
500-900, 5-6½	9.25	11.25
GULF COAST—		
Pale oils:		
200-3	8.50	8.75
300-3	9.00	9.25
500-3½	9.75	10.00
750-3½	10.00	10.25
2,000-4	10.50	10.75
3,000-4	12.25	12.50
PENNSYLVANIA—		
150 vis. at 70° F., 3 color, 400-405 flash:		
Zero pour point		37.50
10 pour point		36.50
15 pour point		35.50
25 pour point		30.00
200 vis. at 70° F., 3 color:		
Zero pour point		39.50
10 pour point		38.50
15 pour point		37.50
25 pour point		32.00

WAX

(Cents per pound)

OKLAHOMA (Group 3)—	
124-126 (A.m.p.) w.c. scale	4.250
PENNSYLVANIA (inland refineries)—	
122-124 (A.m.p.) w.c. scale	4.250
124-126 (A.m.p.) w.c. scale	4.250
NEW YORK—	
Wax in bags fully refined:	
130-132 (A.m.p.) wax	5.850
133-135 (A.m.p.) wax	6.150
Crude scale:	
124-126 (A.m.p.) w.s.	4.250
124-126 (A.m.p.) y.s.	4.250

TANK-WAGON PRICES IN 50 CITIES

(Gasoline prices based on regular grades, tax included, undivided dealer)

ATLANTIC AND NEW ENGLAND
(Socony-Vacuum Oil Co., Inc., and Atlantic Refining Co.)

	Dealer tank wagon	Combined tax	Kero tank wag
Baltimore, Md.	15.95	5.50	10.50
Boston, Mass.	14.90	4.50	9.80
Burlington, Vt	16.90	5.50	10.10
Buffalo, N. Y.	16.20	5.50	10.60
Dover, Del	16.70	5.50	12.00
Hartford, Conn.	15.80	4.50	9.70
Manchester, N. H.	17.30	5.50	10.80
Newark, N. J.	15.20	4.50	9.70
New York, N. Y.	16.10	5.50	9.80
Philadelphia, Pa.	16.20	5.50	11.65
Pittsburgh, Pa.	16.70	5.50	12.00
Portland, Me.	16.30	5.50	9.90
Providence, R. I.	15.00	4.50	9.60
Washington, D. C.	15.20	4.50	11.00
Average 14 cities	16.02	5.14	10.40

(All prices undivided dealer basis.)

CENTRAL
(Standard Oil Co. of Indiana, Standard Oil Co. of Ohio, Continental Oil Co., and Texas Co)

	Dealer tank wagon	Combined tax	Kero tank wag
Chicago, Ill.	13.40	4.50	10.30
Cleveland, Ohio	15.00	5.50	*9.00
Dallas, Tex.	13.00	5.50	7.90
Des Moines, Iowa	14.40	4.50	9.80
Detroit, Mich	14.40	4.50	9.80
Fargo, N. D.	16.90	5.50	11.30
Huron, S. D.	16.30	5.50	10.70
Indianapolis, Ind	15.20	5.50	9.80
Little Rock, Ark.	17.50	8.00	10.00
Milwaukee, Wis.	16.10	5.50	10.50
Minneapolis, Minn.	15.40	5.50	10.30
Omaha, Neb.	15.40	6.50	9.80
Tulsa, Okla.	16.50	7.00	8.50
Wichita, Kans.	12.70	4.50	8.00
Average 14 cities	15.15	5.57	9.61

*Includes 1-cent state tax.

SOUTHEASTERN
(Standard Oil Companies of New Jersey, Kentucky, and Louisiana)

	Dealer tank wagon	Combined tax	Kero tank wag
Atlanta, Ga.	18.90	7.50	*11.50
Birmingham, Ala.	18.50	8.50	9.00
Charleston, S. C.	18.95	7.50	
Charleston, W. Va.	19.25	6.50	13.30
Charlotte, N. C.	20.10	7.50	11.30
Jacksonville, Fla	18.90	8.50	9.50
Jackson, Miss.	17.50	7.50	†9.00
Louisville, Ky.	16.50	6.50	8.50
Memphis, Tenn.	17.90	8.50	10.50
New Orleans, La.	17.75	8.50	*10.00
Norfolk, Va.	17.45	6.50	12.00
Average 11 cities	18.34	7.50	10.48

*Includes 1-cent state tax.
†Includes ½-cent state tax.

MIDWESTERN
(Continental Oil Co.)

	Dealer tank wagon	Combined tax	Kero tank wag
Albuquerque, N. M.	17.50	7.50	10.00
Boise, Idaho	20.10	6.50	16.50
Casper, Wyo.	17.00	5.50	12.00
Denver, Colo.	14.50	5.50	11.00
Helena, Mont.	17.00	6.50	13.00
Phoenix, Ariz.	18.50	6.50	12.50
Reno, Nev.	17.50	5.50	13.50
Salt Lake, Utah	18.50	6.50	14.50
Average 8 cities	17.58	6.25	12.88

PACIFIC COAST
(Standard Oil Co. of California)

	Dealer tank wagon	Combined tax	Kero tank wag
Portland, Ore.	17.00	6.50	13.50
San Francisco, Calif.	14.50	4.50	11.50
Seattle, Wash.	17.00	6.50	13.50
Average 3 cities	16.17	5.83	12.83
Average 50 cities	16.55	5.96	10.76

THE CLIPPER GIVES MAXIMUM PORTABILITY FOR QUICK JOBS ★

For shallow drilling, running tubing, setting packers and liners, fishing—wherever minimum rig-up time and maximum portability are essential, the CLIPPER is the instrument for the job. It combines in one compact, streamlined unit complete accuracy, portability and adaptability for all drilling and production operations not requiring a chart record.

READS IN BOTH POUNDS AND POINTS

Ten easily changed, calibrated dial rings nested within the water-tight case meet every condition—allow *direct readings in pounds or points* for any line (whether 1", 1⅛", or 1¼" for drilling—or ¾" or ⅞" for production work) and in any "string-up" from four to ten lines.

Off and on the dead line in an instant, the Clipper is easily transported from rig to rig and can be used in any spot at any time . . . eliminating haphazard guesswork or estimations.

OTHER UNIQUE CLIPPER FEATURES INCLUDE . . .

EASY READING Large gauge dials with non-glare numerals assure complete legibility from any place on rig floor.

EXTREME ACCURACY The hydraulic diaphragm accurately converts line loads to gauge readings. A special gauge hand gives vernier readings for delicate operations.

CONTROLLED SENSITIVITY The gauge hands have a sensitivity adjustment permitting control of their movements in rough drilling without affecting accuracy.

COMPLETELY SELF-CONTAINED Calibrated at the factory . . . arrives at the rig ready to use. Nothing to pump up and nothing to adjust. Tamper-proof and completely weatherproof.

COMPACT—LIGHTWEIGHT Small size and light weight (height 13", width 12½", thickness 7", weight 50 lbs.) make the CLIPPER easy to move from one job to another.

HOME OF THE WEIGHT INDICATOR

MARTIN DECKER CORP.

LONG BEACH, CALIFORNIA

SAN JOAQUIN VALLEY: A. F. McQUISTON, BAKERSFIELD, CALIFORNIA

MID CONTINENT DISTRIBUTOR: REED ROLLER BIT COMPANY, HOUSTON, TEXAS

Canadian Fields

(Continued from Page 113)

profitable. Since then the refinery has been revamped so the heavy crude can be topped; after which the crude residue will be sold for fuel oil at $1.40 a barrel. With the plant inoperative the field has been producing about 50 bbl. a day, with some additional crude run into earthen pits and a number of wells completely shut down. In full operation the 17 producing wells will yield about 8,000 bbl. a month. Plans are being made for considerable new drilling this spring and summer.

Taber field. — Shipments close to 5,000 bbl. a month are being made from the Taber field in southern Alberta, with Dominion Oil (Standard of British Columbia) 1 supplying most of the production. Northwest Co., subsidiary of Imperial Oil, has acquired nearly 80,000 acres in the general area, its holdings being near Grassy Lake, Purple Springs and Fincastle, in Townships 9 and 10, Ranges 13, 14 and 15w4, somewhat to the east of the present production. Dominion Oil is also planning to drill at least one test this season.

Pekisko. — South of Turner Valley there has been considerable leasing in the district extending from Pekisko to the E. P. Ranch. Major Oil Investments of Calgary has taken over nearly 20,000 acres, chiefly in Townships 14 and 15-2w5. Some encouraging showings were encountered several years ago in wells drilled by the Northwest Co. and Alberta Associated Oils in the vicinity of Rice Creek and Willow Creek, though no commercial production was secured.

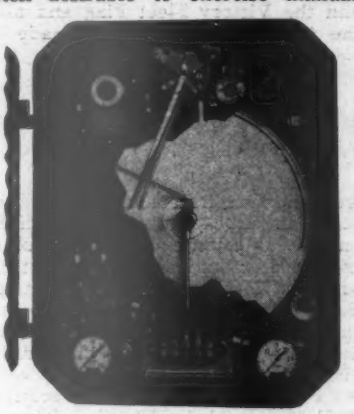
Wainwright deep test. — In the Wainwright field, east-central Alberta, Montreal-Alberta Oils 1, LSD 2, 15-45-7w4, is resuming from around 4,700 ft. The well, located in the Fabyan section of the Wainwright field, was started to test the theory that a lighter grade of crude would be encountered in the limestone underlying the Cretaceous horizons from which the present Wainwright heavy-crude production is taken. Montreal-Alberta 1 has been carried some distance into the limestone and has met some crude showings in that formation.

Ontario.—In the Ontario fields, the Union Gas Co. is following up the completion of a substantial gasser in Zone Township, south and east of the Dawn field, by further drilling. Union 2 Zone has been located in Lot 11, Concession 4, immediately east of the discovery well, Union 119 Dawn, which had an initial flow of 974,500 cu. ft. daily at 1,650 ft. Five additional wells, all drilled by the Dominion Natural Gas Co., have been completed in the Haldimand-Norfolk area, of which three were producers with aggregate output of 72,000 cu. ft. daily.

Equipment Progress

Automatic-Manual Unit For Process Controllers

Although automatic control for continuous processing is more and more in demand by modern industry it is often desirable to exercise manual



control. For example on many applications it is more convenient to start up a continuous process on manual control and switch to automatic control as soon as the process becomes stabilized. Whenever checking, inspecting or repairing of instruments is necessary costly interruptions in processing or expensive standby equipment may be avoided if convenient manual control is possible.

To meet this demand for supplementary control, Taylor Instrument Companies now offer a new automatic-manual control unit with several outstanding improvements over former models.

When the new unit is in a "manual" position, controlling air pressures are also applied to the idle mechanism of the Fulscope controller which is thus maintained in constant balance with the process. Because of this balance, control can be changed instantly from "manual" to "automatic" without causing process disturbances.

In addition to the three usual positions, automatic, manual and service, this new unit contains a fourth step, "test." Set at test, control is manual but the full 20 lb. per sq. in. supply pressure is applied to the instrument mechanism to make possible its complete and accurate readjustment without disturbing the position of the controlled diaphragm valve.

The automatic-manual unit is designed to be installed entirely within the case of a Fulscope single-duty recorder controller. It can be supplied already installed in new instruments, or it may be added to equipment already in the field, without the need of either drilling or tapping the Fulscope instrument. All tubing is supplied preformed for ease of attachment.

Trade Literature

Westinghouse Electric & Manufacturing Co., East Pittsburgh, Pa. — A 57-page booklet describing and illustrating electric drilling rigs to meet any drilling problem. The booklet discusses the advantages of electric drilling, tells where to use d.c. variable-voltage rigs and where to use a.c. equipment. Typical equipments for various drilling depths are listed and maintenance and care are discussed, and also included is a section on auxiliary equipment required on drilling rigs. The booklet is No. B-3038.

Strauss Co., 940 Ewart Building, Pittsburgh, Pa.—Bulletin 143 describing the company's line of head and body protection for men and women industrial workers. The literature includes protector helmets, rain and storm capes, and a new line of safety hats and breast protectors for factory workers.

Marley Co., Inc., Kansas City, Kans.—Bulletin 603, describing conventional-type induced-draft cooling towers. These towers are furnished in a closely stepped ranged of standard end widths from 10 to 30 ft. The bulletin is profusely illustrated.

D. W. Haering & Co., Inc., 205 West Wacker Drive, Chicago, Ill.—A 48-page booklet of articles on scale, corrosion and water-treatment problems reprinted from a selection in the company's house organ, H-O-H Lighthouse. Profusely illustrated, the booklet provides tables, charts and graphs on water problems. It is pocket size.

CLARK BROS. CO. AWARDED ARMY-NAVY "E"

For their "fine record in the production of war equipment," the Army-Navy "E" Award was conferred, March 27, upon the men and women of Clark Bros. Co., Olean, N. Y., The presentation ceremonies, held in the Olean Armory before an audience of 3,500, were presided over by John B. Kennedy, radio and screen commentator.

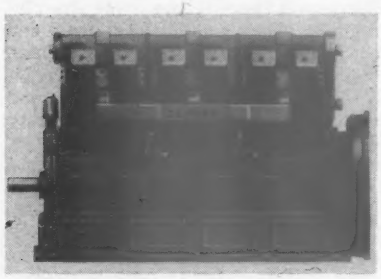
Representing the Army, Lt. Col. Ernest W. Ogram paid tribute to the company for its quick and complete mobilization for the production of war equipment. Speaking for the Navy, Comdr. R. G. Walling charged all civilians with the duty of "seeing that our armed forces are supplied with the best equipment that can be made."

The "E" pennant was accepted on behalf of both management and employes by C. Paul Clark, president of the company. "E" Award pins were thereupon presented to Stephen Rice, Sr., Coletta R. Keeny, Timothy M. O'Brien and Mr. Clark, acting as representatives of the entire organization. The ceremonies concluded with an address by Mr. Rich, president of the Employes Association, who accepted pins on behalf of employes.

Holding the newly won "E" pennant are C. Paul Clark, president of Clark Bros., Inc.; Lt. Col. E. W. Ogram; John B. Kennedy; Comdr. R. G. Walling, and S. J. Rich, Jr.

High-Speed Gas Engine Burns Low-Cost Fuels

Climax Engineering Co., Clinton, Iowa, announces the new V-12 Blue Streak engine—the latest addition to



Climax 12-cylinder Blue Streak engine for operation on gasoline, butane, natural gas or sewage gas

the extensive line of the company's engines and engine-generator sets.

With a normal speed range of 600 to 1,200 r.p.m. and a brake horsepower of 435, the new V-12 meets today's demands for a high-speed engine which will mesh with modern power-consuming machinery for rock or oil drilling, operating large pumps and compressors, driving mining and construction machinery and, with suitable generators, a low-cost means of generating electric power. For oil-field service it is an ideal power unit for deep-well drilling, oil-well and pipe-line pumping and for stationary power and construction service.

It will deliver peak power on natural gas, butane, gasoline or other fuels. Changeover is quick and easy with standard, outside-located accessories.

Each cylinder has two spark plugs. These provide a greater flame, increase power output and remove the possibility of ignition failure.

Standard design features include wet cylinder sleeves, seven-bearing crankshaft, overhead valves, aluminum (five ring) pistons, rifle-drilled connecting rod and fuel changeover devices. Where required, Climax will furnish a complete range of accessory equipment such as starting devices, air cleaners, filters, radiators, heat exchangers, etc.

Porter Opens District Office in Philadelphia

A district office for eastern Pennsylvania, western New Jersey, Maryland, and Delaware was opened by H. K. Porter Co., Inc., Pittsburgh, Pa., in the Girard Trust Building, Philadelphia, Pa., on April 1.

The company, a manufacturer of industrial locomotives and process equipment, reports that its business in this area was more than doubled in the past year. Increased volume of demand for chemical process equipment in particular, and for its new line of wood-tank equipment, has required the installation of the new offices for the most efficient servicing of customers in the territory. Engineering services for the process lines will be made available.

Roy B. Rose, an executive of the company's process division, has been named manager for the territory.

Keuffel & Esser Receives Fourth Award

Keuffel & Esser Co., manufacturers of precision instruments and equipment for engineers, draftsmen and architects, have received their fourth "E" award—the Army-Navy Production Award with three stars. They are one of the first companies in the country to receive a fourth award.

Socony Paint Products Gets Triple Honor

The U. S. Maritime Commission awarded the Maritime "M" Pennant, the Victory Fleet Flag, and Maritime Merit Burgee to the paint products division of Socony-Vacuum Oil Co., Long Island City, N. Y., for their production record in the war effort, on March 18.

This is the first time that a paint company has received both the "M" and the Victory Fleet Flag and also the first award of its kind made in Long Island City.

Among Equipment Men

Three Allis-Chalmers Men Move Up

Three promotions have been announced by W. A. Roberts, manager of the Allis-Chalmers tractor division, involving changes in the company's sales and engineering organizations. They are:

1. A. W. Van Hercke, from sales manager to assistant manager of the tractor division. He will coordinate all engineering and development work.

W. A. ROBERTS

A. W. VAN HERCKE

2. A. F. McGraw, from sales promotion manager to general sales manager, heading up industrial and agricultural sales of the tractor division.

A. F. McGRAW

R. A. CROSBY

3. R. A. Crosby of the advertising department, temporarily loaned to the salvage section of the WPB, will be advertising manager.

Originally brought to Milwaukee from the industrial field organization, Mr. Van Hercke at first specialized on sales to counties and other public bodies, later became Pacific Coast divisional sales manager, then implement sales manager responsible for sales of LaCrosse Works products, then sales manager of the tractor division.

As salesman and branch executive, A. F. McGraw helped to pioneer power equipment methods in agriculture and road building. He has been salesman and branch executive in both the industrial and agricultural fields, having been industrial sales manager of the company's Kansas City branch when he was moved to Milwaukee to head the sales promotion department. For the past year he has been chairman of the advisory council to the research department of the Farm Equipment Institute.

Mr. Crosby came to Allis-Chalmers with the Rumely organization. He has been in the advertising department handling agricultural advertising, both space and literature. He has also been in charge of fairs, exhibits and other advertising functions for the company. His over-all experience suits him ideally for his new position.

Batt, of SKF, Given Bok Award

William Loren Batt, vice chairman of War Production Board and president of SKF Industries, Inc., Philadelphia, Pa., manufacturers of ball and roller bearings, has been awarded the Bok Award—a medal and a $10,000 check—not only for his service to the nation in leading industrial mobilization of the war, but as a citizen who performed the most distinguished service for Philadelphia in 1942. This award is the twenty-

first since its inception by the late Edward W. Bok in 1921.

Since graduating from Purdue University in 1907, Mr. Batt has been the recipient of many outstanding honors. Purdue awarded him the degree of doctor of engineering in 1933, and this year Stevens Institute of Technology conferred upon him an honorary degree of doctor of engineering, Drexel Institute of Technology awarded him the honorary degree of doctor of science, and University of Pennsylvania conferred the honorary degree of doctor of science.

Thermoid Appoints Williams

Thermoid Rubber Division of Thermoid Co., Trenton, N. J., announces the appointment of C. P. Williams as district manager of industrial rubber products sales in the Houston, Tex., territory.

Mr. Williams is well known throughout his area, having sold mechanical rubber goods to the industrial trade and oil industry there for the past 10 years.

To provide speedy and intelligent service to distributors in Texas and part of Louisiana, Thermoid recently opened a large factory branch at San Jacinto Building, Rothwell Street, Houston. A particularly complete line of industrial rubber products is in stock there, including F.H.P. and multiple-V belts, transmission belting, conveyor belting, elevator belting, all types of industrial hose. brake linings and oil-country friction products.

Belknap Elected President of Monsanto; Queeny Board Chairman

Charles Belknap, chairman of the executive committee and executive vice president of Monsanto Chemical Co., has been elected president.

Edgar Monsanto Queeny, for the last 15 years president, was elected chairman of the board, a position vacant since the death of his father, John Francis Queeny, founder and first president of the company in 1933. No executive vice president was elected to succeed Mr. Belknap. In addition to his duties as president, he will continue as chairman of the executive committee.

Mr. Belknap was born in 1880 in Oakland, Md. He was graduated from the U. S. Naval Academy in 1903 and commissioned an ensign, rising to the rank of commander before his resignation in 1919. During World War 1 he was director of the Naval Overseas Transportation Service, reporting to the chief of naval operations. For his accomplishment he was awarded the Navy's distinguished service medal and the Army's distinguished service medal.

He resigned from the Navy in 1919 to become president of the General Steamship Corp. with headquarters in San Francisco. In 1921 he entered the chemical industry as vice president of Merrimac Chemical Co. of Boston, Mass., becoming president in 1928. In 1929, when Merrimac was purchased by Monsanto Chemical Co. in the program of expansion launched by Edgar Queeny, Mr. Belknap became a member of the board of directors and a vice president of Monsanto. In 1931 he was elected executive vice president. In 1939 he was elected to the additional post of chairman of the executive committee, which is the policy-forming body of Monsanto.

Mr. Queeny, who assumed the presidency of Monsanto when he was 30 years old, is a native St. Louisan. The company bears the maiden name of his mother, the late Mrs. Olga Monsanto Queeny.

Mr. Queeny was born in 1897. He matriculated at Cornell University, class of 1919, studying chemistry.

In 1917 he enlisted in the U. S. Navy as a seaman and was sent to the Naval Officers Training School at Newport, R. I., where he was commissioned an ensign the following December. He served 8 months aboard a destroyer tender operating out of Plymouth.

After the war, Mr. Queeny immediately went to work for Monsanto, becoming its first advertising manager. In the early 1920's he entered the export sales department and then was transferred to the general sales department. In 1924, he assumed sales managership and shortly thereafter he was elected a vice president.

Beckley Goes to Los Angeles Office of Baash-Ross

Stewart Beckley, who has been situated at the offices of I. Frank Brown, export representative, New York City, for the past several years, has been transferred to the headquarters office of Baash-Ross Tool Co., Los Angeles, Calif.

Wickwire Spencer Appoints W. A. Steele General Superintendent Buffalo

Wickwire Spencer Steel Co. has announced the appointment of W. A. Steele as general superintendent of the company's Buffalo Works, effective March 15.

Mr. Steele succeeds Fred Johnson, who is retiring from active duty after more than 20 years with Wickwire at its Buffalo plant.

Prior to joining Wickwire, Mr. Steele was with Crucible Steel Co. where he started, in 1923, as a laborer in the blast furnace department.

Simultaneously with Mr. Steel's appointment, Wickwire Spencer announced the appointment of Bennett Lodge as assistant general superintendent of the Buffalo Works.

Brightwell New M.M.&M. Representative in Tulsa

Manning, Maxwell & Moore, Inc., of Bridgeport, Conn., manufacturers of Ashcroft gages, Hancock valves, Consolidated safety and relief valves, and American industrial instruments, announce that a new sales and service representative, Hugh A Brightwell, will represent the products of their four Bridgeport divisions in the Tulsa district.

Mr. Brightwell is training at the present time at their Bridgeport plant.

Cox Named President Of Two Companies

CHARLES R. COX

Election of Charles R. Cox as president of National Tube Co. and of Tubular Alloy Steel Corp. has been announced by the board of directors of these two United States Steel subsidiaries.

Mr. Cox, who for the past 2 years has been executive vice president of National Tube Co., will succeed Benjamin F. Harris, who recently resigned. Mr. Harris is now a consultant to Benjamin F. Fairless, president of U. S. Steel, in connection with war activities.

Coming to National Tube Co. from his position as superintendent of Babbock & Wilcox Tube Co., Beaver Falls, Pa., in 1934, Mr. Cox was employed at the Ellwood Works, Ellwood City, Pa., where he soon became general superintendent of the plant. In 1936 he was appointed vice president in charge of operations.

Correction

Due to a transposition in cutlines, two photographs were erroneously labeled in the April 8 issue, page 140. The photograph labeled W. C. Kinder is that of C. L. Lamkin, while Mr. Lamkin was mislabeled Mr. Kinder. Both men are newly appointed vice presidents of Emsco Derrick & Equipment Co.

Classified Advertising

The Market Place for the Oil Industry

UNDISPLAYED RATE

8 CENTS A WORD, minimum charge $2 per insertion.

SITUATIONS WANTED, 4 cents a word, minimum charge $1.

BOX NUMBERS, count 8 words when replies are to be sent to our Tulsa Office.

10% DISCOUNT if 3 insertions are ordered at one time, with check accompanying order.

All classified advertising payable in advance.

DISPLAYED—PER INCH

Classified display advertising set in single or double column style:

1 inch	1 time	$7.00
1 inch	13 times	6.50
1 inch	26 times	6.00
1 inch	39 times	5.50
1 inch	52 times	5.00

Rates are governed by total space used within 12 months from date of first insertion. Credits are allowed when lower rates are earned.

FORMS CLOSE MONDAY NOON—PUBLISHED EACH THURSDAY

EQUIPMENT WANTED

WANTED: Well servicing units in good condition. All makes and sizes considered. We pay cash. Melton Supply Co., Seminole, Okla.

WANTED: Truck load quantities, or more, of used small pipe, black and galvanized, ½", ¾", 1", 1¼" and 1½", shopped or unshopped. Advise price and location. CENTRAL PIPE & SUPPLY CO., 2611 Avenue H. Lubbock, Texas.

REFINERIES as a whole or in part. Tanks, High Pressure—Atmospheric and Crude Oil Storage, Horizontal or vertical—Boilers—Stills—Bubble Towers—Fractionating Towers—Condensers—Heat Exchangers—Valves—Casings—Line Pipe—Boiler Tubes—Diesel Engines—Bulldozers—Turbines—Draglines—Shovels or what have you for sale? Send Complete Information, price and description. FALLS CITY SALES CO., Phone: Jackson 0189, Box 776, Louisville, Ky.

WANTED: Complete plants to dismantle. Steel storage tanks. Steel buildings. Pipe lines and tank plates in any condition. NATIONAL STEEL & EQUIPMENT CO., 3800 Tulane Avenue, New Orleans, La.

WANTED: 30,000 to 90,000 gal. Steel Vertical Tanks, ⅜" or better. State number available, condition, location, price as is and dismantled. Write W. H. Dyer Co., Fullerton Bldg., St. Louis, Mo.

WANTED: Good used steel drums from 10 gallon to 55 gallon. Can use bad order drums same sizes. Advise price and condition. CENTRAL PIPE & SUPPLY CO., 2611 Ave. H, P.O. Box 1442, Lubbock, Texas.

WANTED: Good used malleable standard screw fittings from one-eighth to four-inch inclusive in all sizes and kinds, also standard screw iron and brass globe and gate valves same sizes. Advise price and condition. CENTRAL PIPE & SUPPLY CO., 2611 Ave. H, P.O. Box 1442, Lubbock, Texas.

WANTED

Abandoned Pipe Lines, in or out of the ground, Oil Wells, Steel Buildings and Steel Storage Tanks of all sizes.

JOS. GREENSPON'S SON PIPE CORP.

National Stock Yards, St. Clair Co., Illinois.

EQUIPMENT WANTED

EQUIPMENT WANTED: Magnetometer for oil prospecting. State price and condition. Box B-581, The Oil and Gas Journal, Tulsa, Okla.

EQUIPMENT FOR SALE

FOR SALE: Used but in good condition, 3,335-¼ x 5" center rings and 6,670 followers, Size 8" for Style # 38 Dresser Coupling. Home Gas Company, Binghamton, New York.

162—3½" OD—6½" Centers—Chrome Key Headers

30—Pieces 3½" ID—4" OD—21' to 28' Long—Chrome Tubes

120—Pieces 3" ID—3½" OD—30' Long—Chrome Tubes

1—½" Shell 5'x74'—4000 barrel cap. Crude Oil Fractionator with Trays

30—Pumps, various sizes and types

A. C. BARTSCH
BOX 127 FOREST PARK, ILL.

FOR SALE:

300—13" OD, 8 thread, new casing couplings

1—Gasoline Power Drilling Rig good for 3000'.

Also Steam Drilling Rigs and pipe and casing of all sizes.

We also purchase abandoned Leases, Refineries, pipe lines and other oil field equipment.

If in need of material or have material for sale, communicate with

Louisiana Iron & Supply Co.
Shreveport Louisiana
Phone 5223 or L.D. 1

EQUIPMENT FOR SALE

FOR SALE: Lufkin pumping unit suitable for 4000' well. Melton Supply Co., Seminole, Okla.

FOR SALE BARGAIN
10—61' Lee C. Moore Tubular Pumping Derricks complete. Galoob Iron & Metal Co., Box 372, Phon 289, Healdton, Okla.

FOR SALE: Used Portable Rotary, Star K type and 45 Supertractor spudders, WL Waukesha and P300 International Skid Engines, 24 KW DC Electric Generator, 30 HP Oil Well Chain mounted Boiler. The Star Drilling Machine Co., Chanute, Kansas.

STEAM DRIVEN LIGHTING PLANT for Sale: G. E. Multiplar Generator, 110 Volts, 261 Amps. Direct connected Steam driven, Switch board and all complete and in A-1 condition. Sacrifice price f.o.b. Morgantown, W. Va. Address Maj. L. H. Jones, % B. M. Chaplin, 211 Race St., Morgantown, W. Va.

FOR SALE: Franks Portable Series H on '37 International Truck, 4x6 Gardner-Denver Pump on skids. 1200' 2⅜" Drill pipe and complete accessary equipment. Box B-584, The Oil and Gas Journal, Tulsa, Okla.

QUICK AND RELIABLE SERVICE — If you want to buy or sell industrial machinery and equipment, steel buildings, tanks, etc., wire or phone us. INDUSTRIAL SUPPLY & EQUIPMENT CO., INC., 1044 Canal Bldg., New Orleans, La.

2 COMPLETE UNITS. 2—100 HP Long Base Continental twin cycle, oil Drilling Engine Comp. with OCS type FC reverse Clutch mounted on Long base, V belt (9-330E) American Air Filter, 1½" F&M—Fig. 55110 Centrifugal Pump. Aux. Starting Unit and Lighting Plant consisting of 5 HP. type B-F&M engine, 3 by 3½ type E. F&M Compressor, 2½ KW F&M Generator, 1—20" by 60" Air tank all mounted on steel base. Price $2,500 Each Unit Complete. Harvey Creek, 3105 N. Broadway, Wichita, Kans.

FOR SALE: Complete 150 ton capacity absorption refrigerating machinery. Steam driven air compressor 650 C.F.M. Steam driven A.C. Generator 75 K.W., 220—3—60. Two Vogt water tube boilers 250 H.P. each, 125 lbs. Ice cans, Cranes, Steam pumps. CAPITAL ICE REFRIGERATING CO., INC., Indianapolis, Ind.

TANKS FOR SALE

6—1500 Barrel Bolted Steel Tanks—Located in Oklahoma City, Okla.

2—2000 Barrel Bolted Steel Tanks—Located in Oklahoma City, Okla.

2—2000 Barrel Bolted Steel Tanks—Located in Bancroft, La.

Miscellaneous horizontal storage tanks, 6000 to 25,000 gallon.

HORWITZ PIPE & SUPPLY CO.

65 N. Madison, Tulsa, Okla. Phone 2-9128
415 S. Western Ave., Oklahoma City, Okla. Phone 3-4469

FOR SALE

One steam drilling rig complete with 4 and 6 inch drilling pipe. Ready to move on location. This rig is practically brand new. Capable of drilling 12,000 ft. A bargain.

One steam drilling rig complete with 4 and 6 inch drilling pipe. Ready to move on location. Good condition. Bargain.

Also 9,000 ft. 2½ inch and 2,000 ft. 2 inch line pipe.

Complete inventory will be furnished upon request.

FRANK & FRED JONES DRILLING COMPANY

1506 Tower Petroleum Building
Dallas, Texas Phone R-1585

Classified Advertising

LEASES AND DRILLING BLOCKS

FOR SALE: Oil property and country estate located in Venango Co., Pa. 430 acres of land, timber, some coal, 21 bbls. of oil daily, no pressure used. 106 oil wells, 7 powers. Complete set of buildings for oil and farm use. Owners home furnished with antiques, etc. Address Owner, 10 West Third St., Oil City, Pa.

WANTED TO PURCHASE developed producing oil properties in Kansas or West Texas. Prompt action. C. C. Harmon. Nowata, Okla.

CONSIDER sale or development five thousand lease block Gove County, Kansas, near recent discovery by Union Oil Co. Box B-585, The Oil and Gas Journal, Tulsa, Okla.

LEASES ROYALTIES
PRODUCING OR NONPRODUCING
Texas, New Mexico, Oklahoma.
Louisiana and Illinois.
20 Years' Experience
Inquiries Invited
B. D. BUCKLEY
60 Broadview Drive, Clayton
St. Louis, Mo.

LEASES AND DRILLING BLOCKS

ILLINOIS LEASEHOLDS. Edgar & Douglas Counties, Some acreage to sell located within the two mile limit of a test near Hindsboro, 24 miles from the best payoff ever discovered in the Americas, The Westfield Pool. Sam J. Burkitt, Hindsboro, Ill.

NEW MEXICO
State Oil and Gas Leases
Forty acres and multiples thereof, in a new HoT spot. 23 oil companies own surrounding leases. Write for information. No obligation. HARRY S. WRIGHT, New Mexico State Lessee, Farmington, N. M.

MONEY RAISING

WANT $2500. Help further develop and ship large high grade manganese deposit. If qualified, see at once. Elyn Shaw, Box #292, Magdalena, New Mexico.

WANTED

WANTED: National Oil Scouts & Landman's Ass'n. Year Books, Vols. 1 to 6 inclusive. Ward-S. Merrick, Box 971, Ardmore, Okla.

FINANCING

CAPITAL SEEKERS—Interested in raising $25,000 or more for a legitimate project should write to AMSTER LEONARD, Fox Theater Bldg., Detroit, Mich.

California

(Continued from Page 113)

Angeles and the status of this well should be determined within the next 30 days unless the basement is considerably deeper than is generally believed. The outcome of drilling on this well may have a decided effect on leasing activities in the old Los Angeles City field and provide a definite course of action on the part of the council. Shell at Salt Lake has been drilling for several weeks and has yet to receive a compaint because of noise or other objectional conditions. George F. Getty, Pacific Western Oil Co., Seaboard Oil Co. et al are still aggressively taking leases in the Los Angeles City field and this work will probably consist of several jobs instead of one large block.

LOS ANGELES BASIN COMPLETIONS

Huntington Beach, Orange County: Signal Oil & Gas Co. 43-A Bolsa, 33-5s-11w, flowed 420 bbl., 26-gravity, 10 per cent cut, T.D. 4,900 ft., perf. 3,992-4,706 ft., completed in lower Bolsa zone of Pliocene age.

Wilmington, Los Angeles County: Long Beach Oil Development Co. 46-W Harbor, 10-5s-13w, pumped 200 bbl., 15.8-gravity, 0.1 per cent, T.D. 3,307 ft., P.B. 3,257 ft., gravel packed perf. 2,964-3,114 ft., 3,159-3,252 ft., completed in Ranger zone of Pliocene age.

Long Beach Oil Development Co. 14-X Harbor, 2-5s-13w, flowed 300 bbl., 15.3-gravity, 0.1 per cent cut, 220,000 cu. ft. gas, 30/64-in. to 12/64-in. bean, pressures 460/700 lb., T.D. 2,237 ft., perf. 2,054-2,232 ft., completed in tar sand overlying the Ranger zone of Pliocene age.

Rio Hondo wildcat district, Los Angeles County: Potrero Oil Co. 1 Newman, 32-1s-11w, abandoned as dry hole, T.D. 7,111 ft., form. test 5,060-5,200 ft., tested wet, form. test 5,060-5,150 ft., tested wet, form. test 4,670-90 ft., tested wet, top of Repetto 4,850 ft.

COASTAL DISTRICT

Ventura County.—Tide Water Associated Oil Co. has reached a depth of 6,302 ft. in 2 Hidden on the Hidden anticline in Ventura County and is at present opening up the hole from 8½-in. to 12¼-in. for a test of some showings found in the bottom of the hole. Three miles southeast of Tide Water Associated's test, Standard has staked location for a wildcat to be drilled in 14-4n-18w, but actual drilling may not get under way for another several weeks due to bad roads. In the Rincon field, Honolulu Oil Corp. got a wet job on well No. 5 on State Tideland Permit 56 at 3,246 ft. and the well has been suspended pending decision as to whether to go ahead. Locations are being prepared for seven new wells to be started in the Ventura Avenue field by General Petroleum and Tide Water. The former will drill 26 Barnard to the B-5 zone and 27 Barnard to the B-6 zone, both of Pliocene age. Associated will drill one well on the Hartman, Lloyd and McGonigle and two on the Ventura Land & Water Co. property.

Santa Barbara County.—Tide Water Associated Oil Co. appears to have found a virgin accumulation of heavy oil in the Zaca Creek district in the coastal district. The oil ranges from 9 to 11 gravity. It has a high fuel-oil and asphalt content and at present prices would make an ideal type for the manufacture of asphalt. In order to make it available for fuel oil it would be necessary to add about 35 per cent gas oil or other light fractions to bring it up to standard specifications. The addition of this higher-price blending agent would raise the cost of the finished fuel oil and make the undertaking not any too profitable. The well, 1 Chamberlain in 33-8n-31w, is producing from 150 to 200 bbl. net per day from the lower zone which is somewhat comparable with that produced by the upper zone at 4,430 ft. Present bottom of the well is 5,194 ft. Union Oil Co. has decided to go back into 1 Hartnell, an old well in the Santa Maria district, and attempt to redrill it and bring it back into production. This well was originally completed flowing 10,000 bbl. per day in December 1904 from a depth of 2,780 ft. It subsequently declined, was later recompleted doing 500 bbl. per day and abandoned a few years later in 1918. This was one of the largest flowing wells completed in the area at the time. It will be interesting to watch the outcome of this redrill job which will consist of cleaning out the hole and possibly whipstocking the hole.

COASTAL DISTRICT COMPLETIONS

San Miguelito, Ventura County: Continental Oil Co. 28 Grubb, 23-3n-24w, flowed 350 bbl., 31.2-gravity, 50 per cent cut, 64/64-in. bean, T.D. 7,582 ft., P.B. 7,310 ft., perf. at intervals 6,350-7,310 ft., completed in Grubb zone of Pliocene age.

Zaca Creek, Santa Barbara County: Tide Water Associated Oil Co. 1 Chamberlain, 33-8n-31e, pumped 190 bbl. net, 10-gravity, 40 per cent cut, T.D. 5,194 ft., perf. 4,449-5,189 ft., top Sisquoc 1,400 ft., pumping test of interval 3,685-4,430 ft., 200 bbl., 10-gravity, 26 per cent cut, completed in lower zone.

Crude-Oil Prices

Representative selected crude prices from all sections of the country appear below:

East Texas	$1.2[illegible]
Conroe	1.43
Tepetate, Louisiana	1.18
Illinois basin	1.37
Pecos County, Texas	.9[illegible]
Bradford, Pennsylvania	3.00
Van, Van Zandt County, Texas*	1.00

*No change since 5-21-41.

Gravity Schedules

Top prices include all gravities above grades designated, and low prices include all gravities below grades designated:

Gravity—	Signal Hill, Calif.	Oklahoma, Kansas	Gulf Coast Texas	West Texas*
18-18.9	$0.80			...
19-19.9	.84		$1.06	$0.70
20-20.9	.88	$0.85	1.08	.72
21-21.9	.92	.87	1.10	.74
22-22.9	.96	.89	1.12	.76
23-23.9	1.00	.91	1.14	.78
24-24.9	1.03	.93	1.16	.80
25-25.9	1.07	.95	1.18	.82
26-26.9	1.11	.97	1.20	.84
27-27.9	1.15	.99	1.22	.86
28-28.9	1.18	1.01	1.24	.88
29-29.9	1.20	1.03	1.26	.90
30-30.9	1.23	1.05	1.28	.92
31-31.9		1.07	1.30	.94
32-32.9		1.09	1.32	.96
33-33.9		1.11	1.34	.98
34-34.9		1.13	1.36	1.00
35-35.9		1.15	1.38	1.02
36-36.9		1.17	1.40	1.04
37-37.9		1.19	1.42	1.06
38-38.9		1.21	1.44	1.08
30-39.9		1.23	1.46	1.10
40 and above		1.25	1.48	1.12

*Includes Lea County, New Mexico.

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Journalisms:

THE normal method of analyzing mixtures of hydrocarbons is by means of a fractionating device in which the different components are separated on the basis of their boiling points. In next week's Journal, Nelson C. Turner of the engineering and construction division, Frick-Reid Supply Corp., shows how accurate analyses may be made by separating components on the basis of the difference in composition of the phases adsorbed and unadsorbed by activated charcoal.

N. C. TURNER

R. C. ALDEN

WITH increasing demand for aviation gasoline there is a shortage of isobutane and more normal butane must be isomerized to provide this needed material. The amount provided by the deisobutanizer may be inadequate and in next week's issue of the Journal R. C. Alden, head, research and development department, Phillips Petroleum Co. shows how a butane isomerization unit, an isobutane cracker and an alkylation or codimer unit may be added.

IN drilling at Lindsborg, in Kansas, two highly permeable gravel beds require the setting of two strings of surface pipe. Unless this is done properly, operators have found that there is much danger of cratering and loss of the hole. A staff article, to appear in the Engineering and Operating Section next week, describes the methods used in coping with this difficulty.

USE of gas from an overlying horizon in lifting oil from two lower zones in a Permian basin field will be discussed in a staff article.

CALENDAR

April

NATURAL GAS MANAGEMENT CONFERENCE, under auspices of Natural Gas Section, American Gas Association, Gibson Hotel, Cincinnati, Ohio, April 28.

A.G.A. DISTRIBUTION CONFERENCE, Netherlands Plaza Hotel, Cincinnati, Ohio, April 29-30.

AMERICAN PETROLEUM INSTITUTE, DIVISION OF PRODUCTION, Southwestern District, Rice Hotel, Houston, Tex., April 29-30.

May

PETROLEUM INDUSTRY ELECTRICAL ASSOCIATION, annual meeting, Houston, Tex., May 5-6, 1943.

AMERICAN INSTITUTE OF MINING AND METALLURGICAL ENGINEERS, Petroleum Division, Baker Hotel, Dallas, Tex., May 6-8.

INDEPENDENT PETROLEUM ASSOCIATION OF AMERICA, midyear meeting, Jefferson Hotel, St. Louis, Mo., May 7-8.

AMERICAN PETROLEUM INSTITUTE, spring meeting, Division of Production, Mid-Continent district, Mayo Hotel, Tulsa, May 20-21.

JOINT PRODUCTION AND CHEMICAL COMMITTEE CONFERENCE, sponsored by Technical Section of American Gas Association, Hotel Pennsylvania, New York, May 24-25.